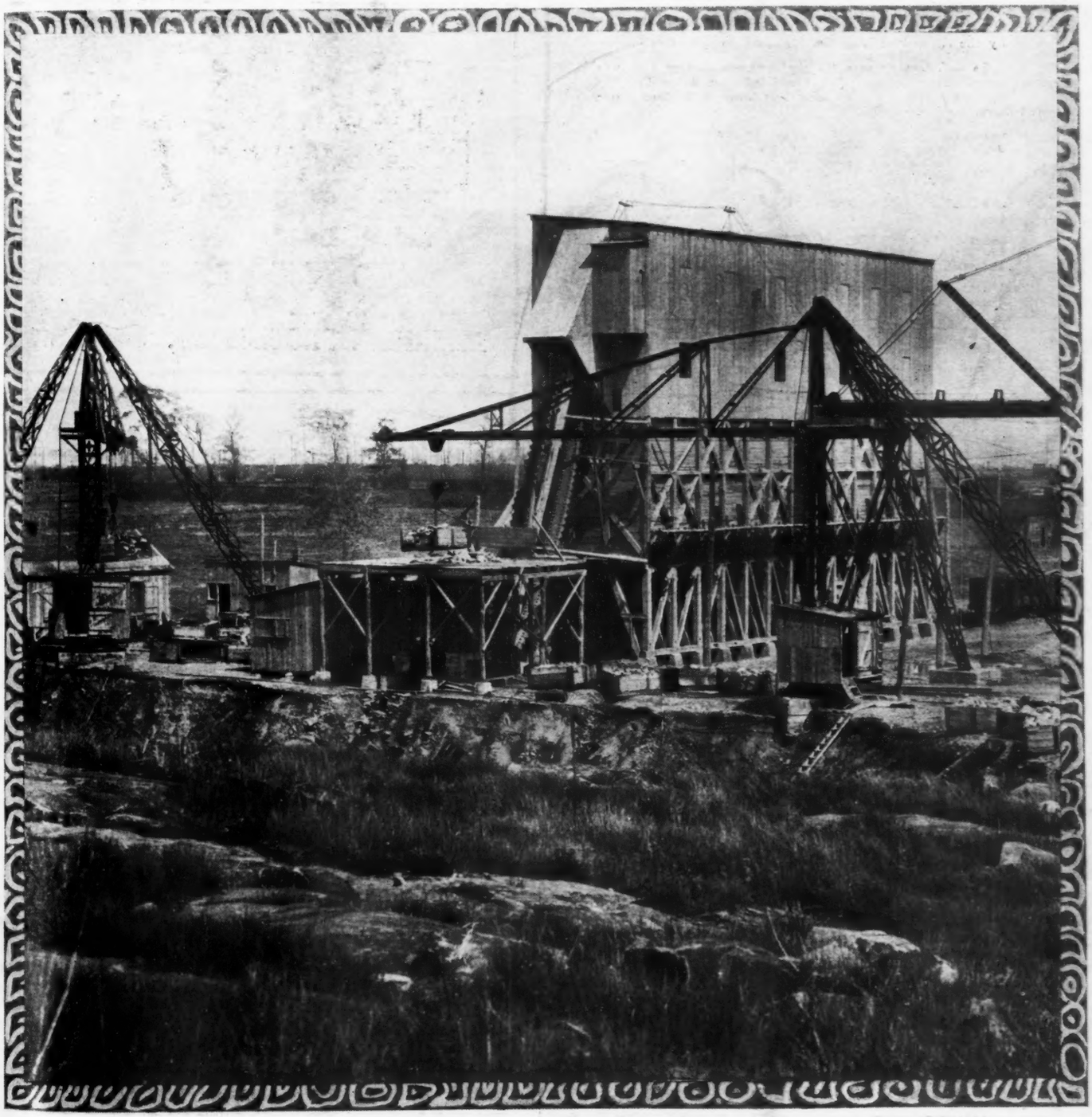
27/15

Rock Products

$2.00 A YEAR CHICAGO JULY 19, 1919



for 5 years the elements tried to destroy it—but today it is as good as new

A Keystone Kiln has stood—with top uncovered—since 1914 at a deserted quarry of the Montgomery Lime Company in Houchins, Va.

Today it is being moved sixty miles to a new location by the Kimbalton Lime Co. It is as good as new!

So satisfactory was its performance during the nine years of actual use that the Kimbalton Lime Co. has ordered a sister kiln to meet increased-production plans.

Keystone Kilns

Here you have proof of singular durability and working merit. And note that the Keystone can be moved. This can be done with no other kiln.

236 Kilns in Use to Date

Steacy-Schmidt Manufacturing Co.
York, Penna.

"PENNSYLVANIA"
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For Crushing and Pulverizing Lime, Limestone, Gypsum, Marl, Shale, Etc. Main Frame of Steel, "Ball and Socket" Self Aligning Bearings; forged Steel Shaft; Steel Wear Liners; Cage adjustable by hand wheel while Crusher is running. No other hammer Crusher has such a big Safety Factor.

Pennsylvania Crusher Company
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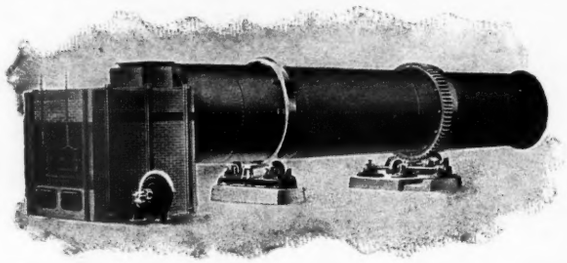

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Some of our customers who are using our Puncture and Waterproof bags report one-third increased sales to their satisfied customers. Also report breakage for 1917 and 1918 from all causes only one-half of one per cent.

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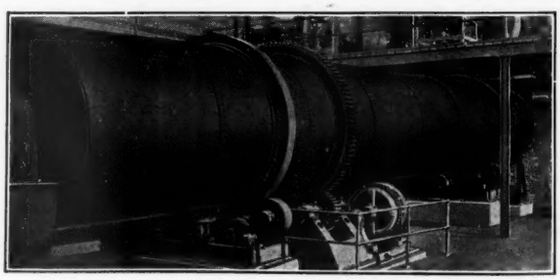

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Delivering material to hopper which discharges to belt conveyor and crusher

ROCK PRODUCTS is published every other week by Tradepress Publishing Corporation, 542 So. Dearborn St., Chicago. Subscription: $2.00 a year in the United States, $3.00 in Canada. Entered as second class matter July 2, 1907, at the postoffice in Chicago, under Act of March 3, 1879.

VOL. XXII—No. 15
July 19, 1919

Rock Products seeks and reports everything of interest to producers of crushed stone, sand, gravel, lime, cement, gypsum products, agricultural limestone, phosphate, potash and glass sand. It spends many times more money than any other journal of the industry to compile its message every two weeks. Appreciate Rock Products.

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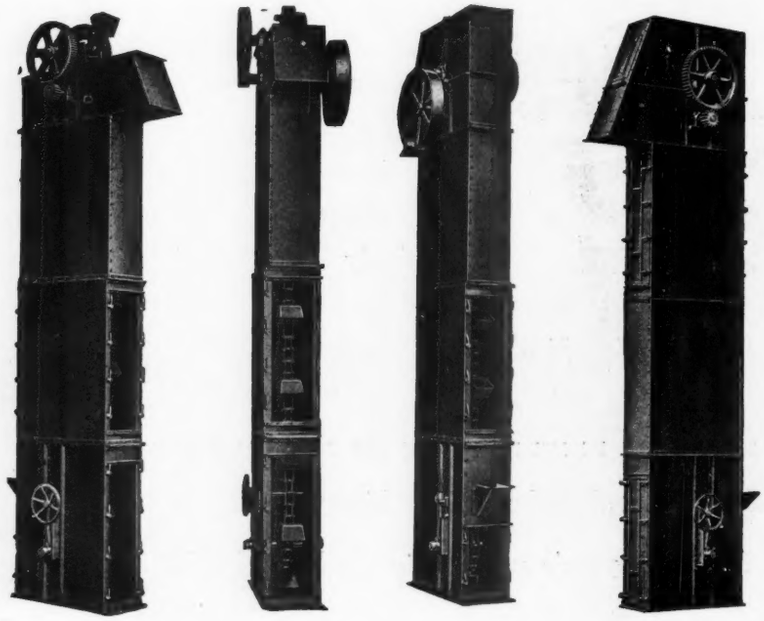

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The Bradley Hercules Mill

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These mills are now in operation in Pennsylvania, Illinois, North Carolina, California, New York, Oklahoma, Washington, Cuba, and Argentina. Several fine installations in Pennsylvania in the heart of the cement business. Look up the installation in your section. Ask us to show the saving in the use of this mill in comparison with others. Ask any operator.

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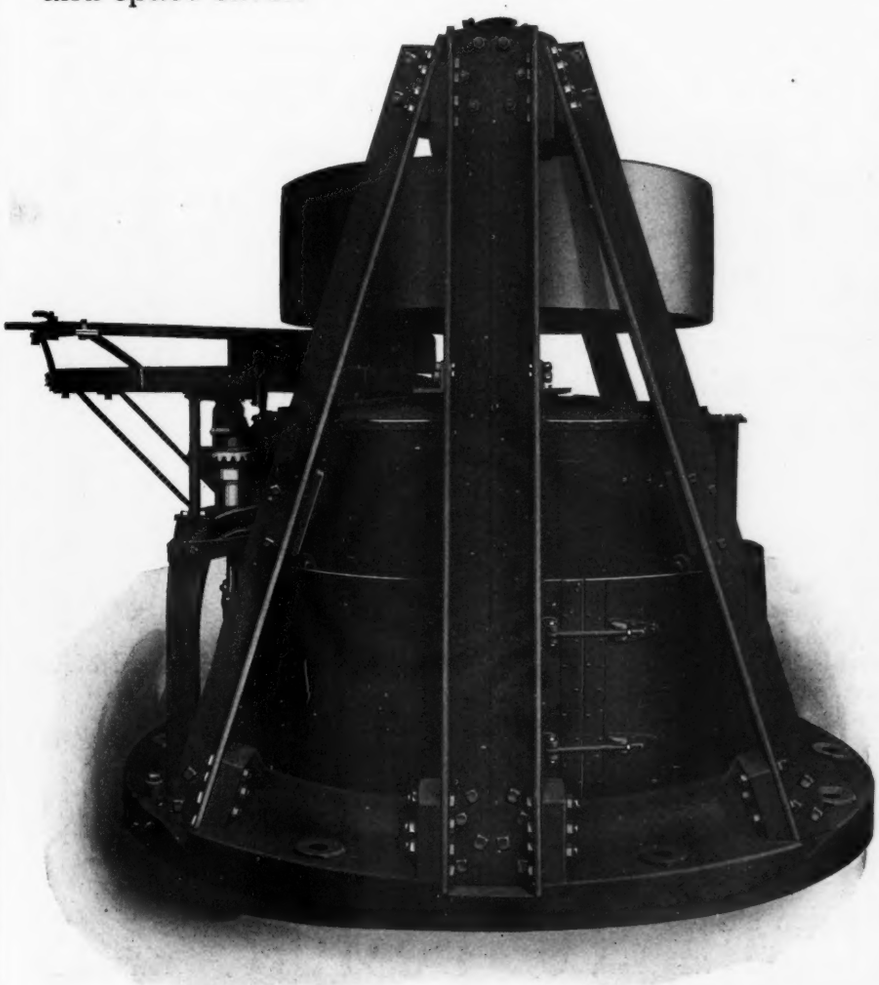
It's quiet, dustless, easy to operate, positive in operation—a big labor and space saver.



Our engineers will gladly submit drawings and data showing comparison between a Bradley Hercules layout and your present installation.

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Twenty-five of these enormous mills sold or in operation. All successfully grinding either raw material—limestone or clinker.

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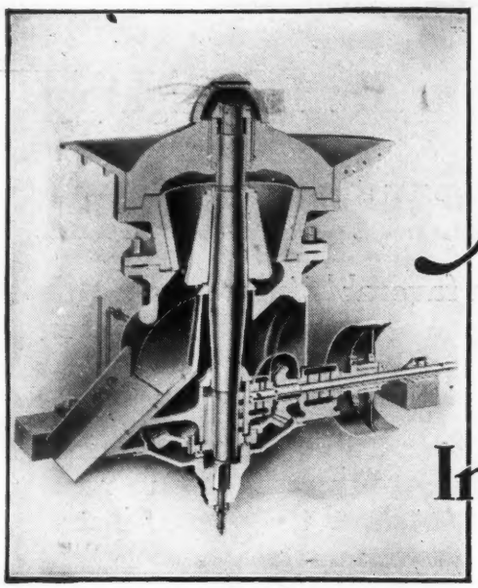
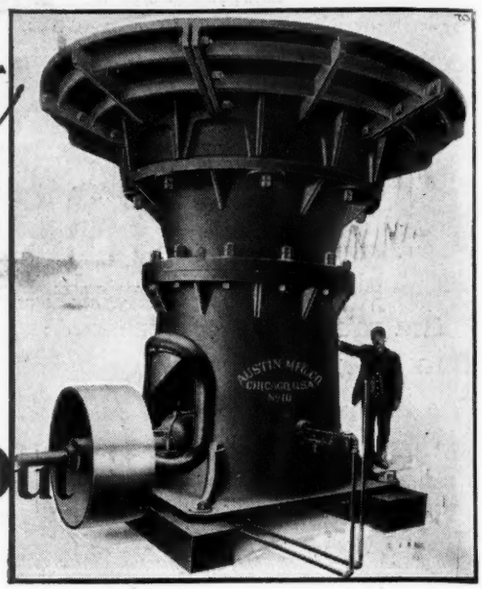


Austin
Rock Crushing Equipment

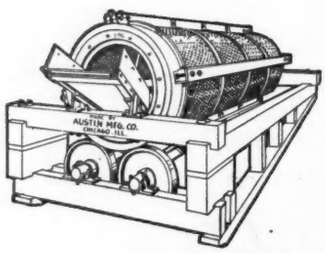
Examine *both* Inside and Out



THE more you look into the internals of the Austin Gyratory Rock Crusher, the better we are pleased. For the real mechanical superiority of any machine lies in its working parts. When a prospective user examines the details of the Austin Crusher he finds numerous practical features not found in others —features which insure greater durability and output with little wear and tear and less horse power consumed.

Austin screens, elevators, quarry cars, hoists, etc., as well as the gyratory crusher, are looked upon as "standard" by quarrymen and engineers who know what good machinery is.

Our new quarry equipment catalog, fully illustrated, and descriptive of the entire Austin line, is now available and will be sent to you upon request.



We manufacture the following machines:

Gyratory Rock Crushers
Motor Tandem Rollers
Macadam Rollers, Steam and Motor
Portable Stone Bins
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Stone Screens
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Street Sprinklers
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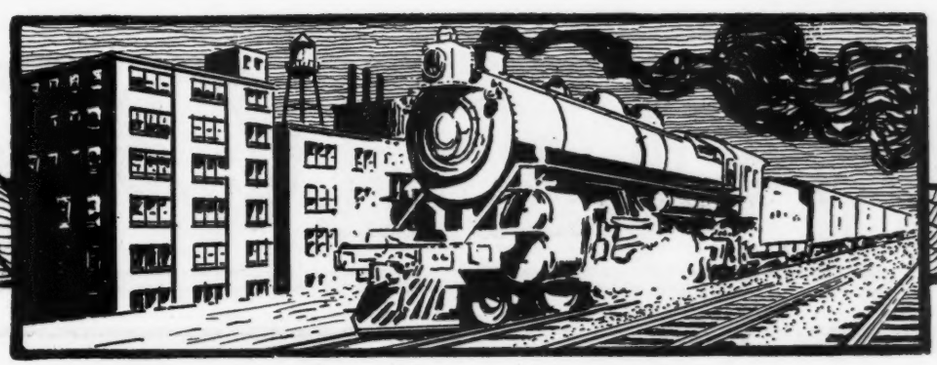

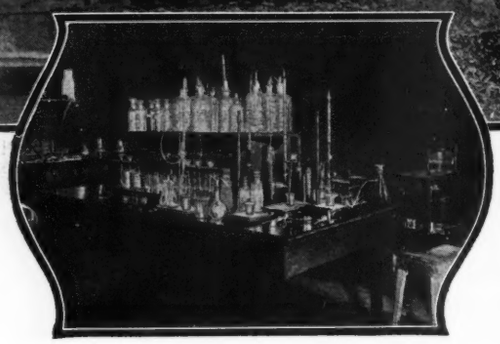

"The acid test" has a real meaning at the "Marion" plant. Here is a corner—just a corner—of our Chemical Laboratory, where careful analysis is made of all the materials that go into "Marion" equipment.

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They go deep on the property of the Bessemer Limestone Co., Youngstown, Ohio, and Bessemer, Pa. First, through an overburden of top-soil; then a vein of good coal; next a thick bed of fire-clay; after that a heavy course of brick-making shale; and fifth, a deep stratum of commercial limestone.

Five "Marion" Shovels owned by this corporation are doing the work—doing it with an efficiency, economy and a businesslike precision that has quite won the owners' hearts.

"Marion" service on this particular operation is a good index of the work hundreds of other "Marions" are doing on important jobs, the world over. It explains why "Marions" get the call when the demand is for maximum capacity and endurance under a steady, hard, day-after-day grind.

"Marions" will do *your* work—will *see it through.* We shall be pleased to send particulars.

THE MARION STEAM SHOVEL COMPANY

Established 1884 Marion, Ohio

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Marion

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A Peek Into Our Plant

would agreeably surprise you. Here you would find the most modern machines; premium workmen; expert supervisors—all working to maintain the reputation of

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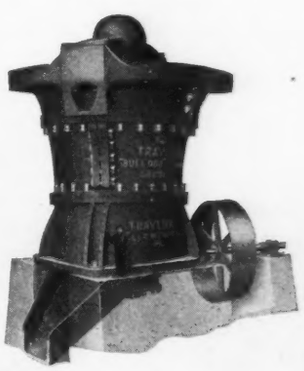
Added to the favorable conditions under which they are manufactured are exclusive, patented features of construction.

For example: The Traylor Bulldog Gyratory Crusher here shown has a shaft shorter than others, and stronger. A self-aligning eccentric journal. A force-feed lubricating system. Cut steel gears, and the Hewes spider, the strongest and most reliable spider of them all.

We make gyratory and jaw crushers, and crushing rolls. Fully described in Bulletins R-G-4, R-GX-1, R-J-2, RJX1, and R-R-1. In what model



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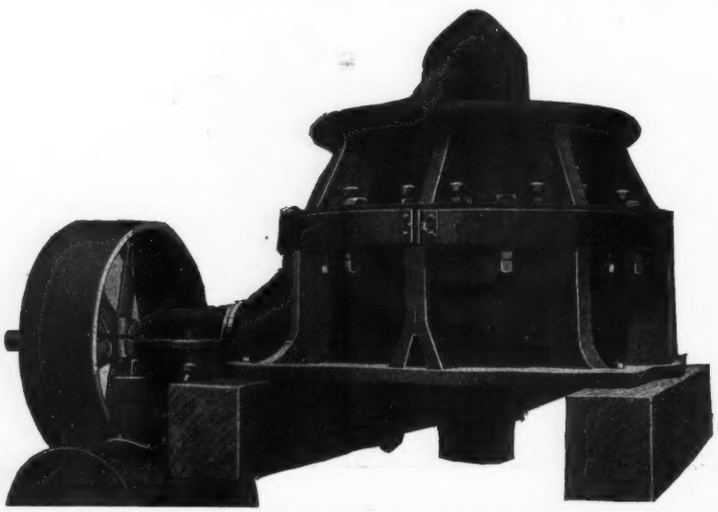
Glad to send you Bulletin No. 2-F-11 covering this machine—also our Catalog No. 166 covering Telsmith Breakers.

Smith Engineering Works

3188 Locust St., Milwaukee, Wis.



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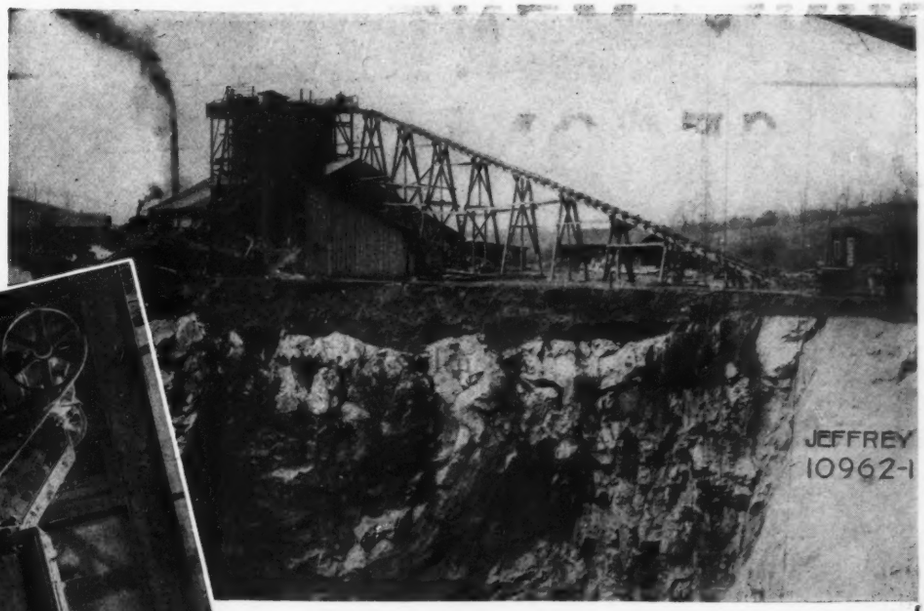
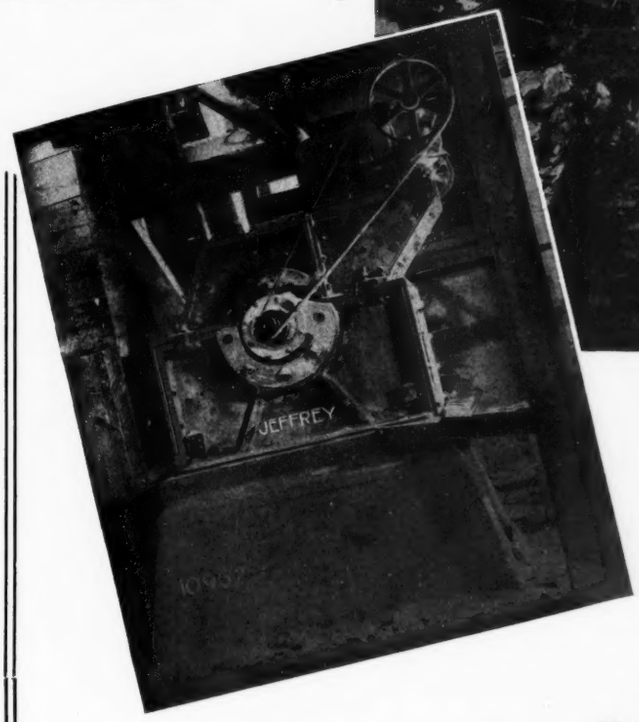
Jeffrey Type "D" Pulverizer in operation at the Blue Ridge Lime Company, Fletcher, North Carolina.





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With

JEFFREY

Type "D" Ball Bearing PULVERIZERS

Especially Adapted for Making Agricultural Limestone

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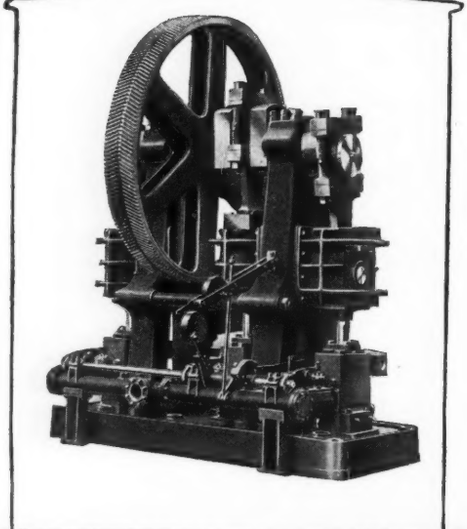
It is peculiar of Worthington products that while they were vital to winning the war, they are equally as essential to peace-time industry. Now with eight enormous factories of greatly enlarged capacities and increased facilities for emergency production, Worthington is better prepared than ever to resume its position as world-wide headquarters for industrial equipment.



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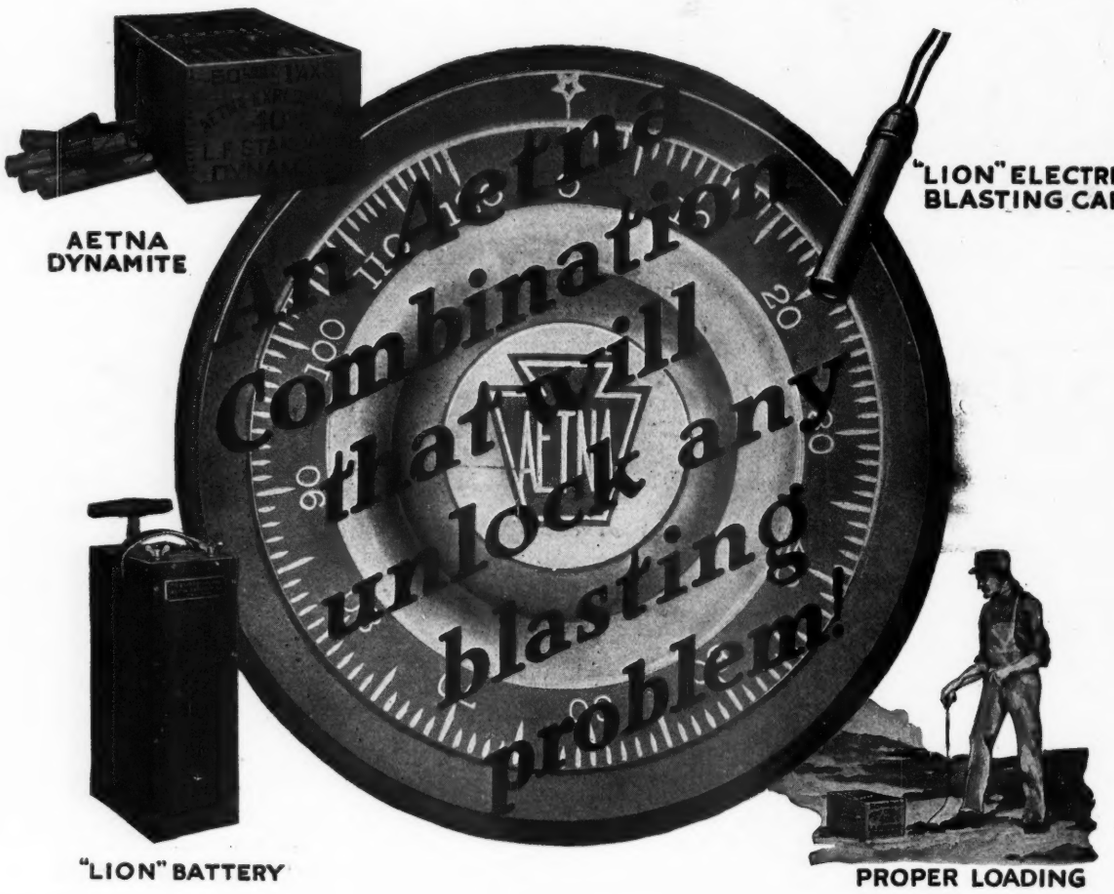

AETNA DYNAMITE—of a particular grade that will suit your individual requirements—should be the first point to turn to on your dial of blasting problems, because it is so made as to represent, figuratively, when properly loaded, the right "tumbler" in your locked-up strata. And, Aetna Dynamites differ essentially from most brands in that they produce less fumes.

Turning to "Lion" Electric Blasting Caps, they contain a Fulminate of Mercury charge, which makes them the most dependable and efficient detonator known. We direct your attention to the .30 calibre diameter of "Lion" Electric Blasting Caps. The advantage of this diameter shell is that it gives the maximum concentration of charge, which is of vital importance. If a smaller diameter shell is used the same sized charge would be proportionately longer, and instead of a powerful blow being delivered upon a small area—such as our .30 calibre shell gives—there would be a diminished one over an extended area, with the possibility of imperfect detonation.

Then turning to Proper Loading, we find a point that is often out of true in general practice. We will mention here only one instance: We have known of blasters who have put an Electric Blasting Cap with a four-foot lead in a hole twenty feet deep and then attached light connecting wire to it because it is cheaper than the longer wires of a twenty-foot Electric Blasting Cap which are made to withstand a greater pressure. No matter how carefully a joint is made, there is more resistance to the firing current in a joint than there is in solid wire. This idea—and we have seen it used many times—is a mighty expensive attempt at economy. Proper loading, from the first stick of dynamite to the top of the tamping, and the making of proper connections, is all important.

Finishing up the combination with a "Lion" Blasting Machine, we have in it a powerful dynamo, simply constructed, yet in such a way, and of such materials, that it withstands hard usage and comes as near taking care of itself as any machine can.

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Prompt attention will be given your inquiry if you mention ROCK PRODUCTS

Rock Products

Vol. XXII Chicago, July 19, 1919 No. 15

Specifications for Sand and Gravel

Closer Cooperation With Engineers, Architects and Contractors—More Interest by Producers in Tests of and Uses for Their Product

VERY LIKELY MANY SAND AND GRAVEL producers who read the report of the fire-proofing committee of the American Concrete Institute on page 53 of the July 5 issue of ROCK PRODUCTS, were a little peeved at seeing it in a journal serving their industry. However, a little consideration will show that it was given them to read because they ought to read it and because it ought to make them sit up and take notice.

This report is only a sample of the activities of architects, engineers and other users of mineral aggregates which will have a vital bearing on the future of the sand and gravel industry. In testing and discussing the results and specifying the methods of preparation of other materials, the manufacturers and producers take an active part. They have done so in self defense, although their co-operation is welcomed and is often very essential. The interest and co-operation of sand and gravel producers is just as essential and just as much desired.

For instance there is under way an investigation of plaster sand, the ultimate results of which in the way of building codes, will certainly be a matter of great importance to the producers of sand. There is a committee at work on concrete aggregates whose report and specifications will in all probability be the rule and guide for nearly all future construction work. At the recent Atlantic city meeting of the American Society for Testing Materials a sub-committee of the committee on road materials was established with the intention of working out standard sizes of aggregates. Certainly sand and gravel producers should be in intimate touch with all these activities. As was pointed out in a recent issue of ROCK PRODUCTS, legitimate producers of sand and gravel are furnishing not more than two-thirds of the sand and gravel used in concrete and building construction. In other words, a good share of the stuff that goes under name of sand and gravel is still of the side-of-the-road, unscreened, uncleaned and unwashed variety. And much of the ill repute that sand and gravel has gained in many instances is based on experience with just such material.

The manufacturers of cement would not for one minute sit by and see reports reflecting on the value of cement made and circulated by engineers, if based on tests of a single brand of cement; nor would lime manufacturers allow statements to go broadcast reflecting on all lime because that made from some particular limestone was unsatisfactory. Yet sand and gravel men allow engineers and architects to believe that because one or two quartz gravels have not stood up under fire tests, all gravels are in the same category!

Gravel, meaning the stone part of a sand and gravel plant output, may be any kind of stone. In the Middle West limestone belt most of boulders and pebbles which make the gravel are undoubtedly limestone. Certainly very little of it is granite or quartz. Many sand and gravel plants are producing crushed stone in the practical meaning of the word. Yet to the rank and file of engineers and architects, an unfavorable report on gravel means an unfavorable report on anything any gravel plant turns out.

A great state in the East which at present is very active in concrete road building, will not allow the use of gravel in concrete roads. Apparently this is the direct result of some extremely unfavorable experience with gravel concrete roads in a neighboring state. Yet in the neighboring state the roads which proved so unsatisfactory were built of unwashed, unscreened, side-of-the-road "gravel" so-called; and more than that, most of them were on jobs "skinned" by contractors. Yet as a result of the publicity given these roads among highway engineers a prejudice against gravel concrete was allowed to come about.

These are conditions which nobody but the legitimate producers of sand and gravel themselves can rectify. The producers should be represented on such commit-

tees as those referred to, they should give freely of their knowledge and experience for the benefit of users of the material, they should make tests and experiments to fortify their contentions, they should be prepared to improve their product where improvement is possible, and they must recognize frankly and honestly such limitations of their material as really exist and make capital of them rather than to fight the inevitable.

For example, although the Pittsburgh fire tests of concrete columns have been and probably will continue to be made use of by the producers of other mineral aggregates to "knock" gravel, as a matter of fact one of the principal objects of the tests of last year was to find methods of fire-proofing gravel concrete, because it was acknowledged in the premise that the economics of construction require the use of gravel concrete. And these tests have practically demonstrated that gravel concrete can be protected by a plaster coating, at a cost less than concrete of crushed stone aggregate could be made.

There is of course no danger that gravel concrete will ever be crowded off the map by any limitations that it may have. It will always have the one great big advantage of being the most easily and cheaply produced mineral aggregate. Nevertheless, for the best interests of the industry, it is time for the men in it to break through the shell and get in closer touch with the men who are going to fix the standards for mineral aggregates in the years to come.

Layout of a Sand and Gravel Plant Now Working Its Third Pit

Richardson Sand Co., Coleman, Ill., Carries Immense Storage of Finished Material —Much Crushing Done

PROBABLY, first of interest at the Coleman, Illinois, plant of the Richardson Sand Co. is the layout. Other facts that will interest producers are the high percentage of gravel in the bank and boulders, necessitating considerable crushing; the big storage pile and the matter of power which is steam exclusively.

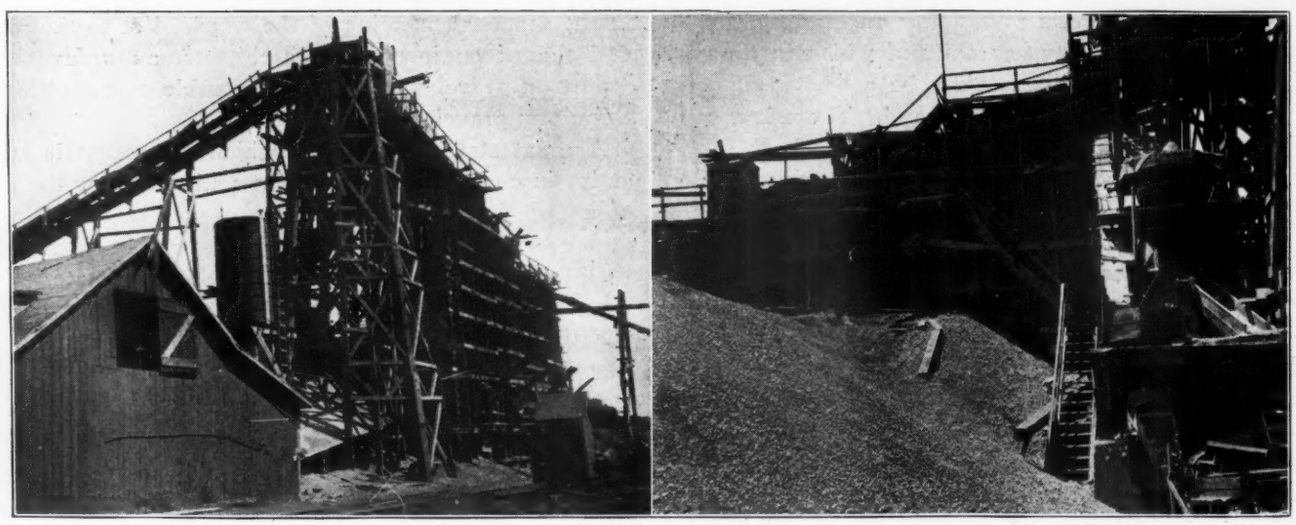
In the beginning of the Richardson operation at Coleman, the material was dug by drag line. In time the extreme limit of distance for satisfactory production with a drag line was reached and locomotive equipment was installed. The company is now engaged on its third pit at this plant, a half mile from the plant by rail, although as the bird flies the distance is shorter. Mounds of overburden and the lay of the land interfere with a direct route for the railroad.

The overburden is not deep, averaging not over 2½ ft. It is stripped by a small steam shovel, style A, with a 1½ cu. yd. bucket. Dumping is done into the excavated portion of the pit or along the edge of property near the Fox River reached by dump cars.

For digging, a model 80 steam shovel with a 3½ cu. yd. bucket is used. This keeps three men employed.

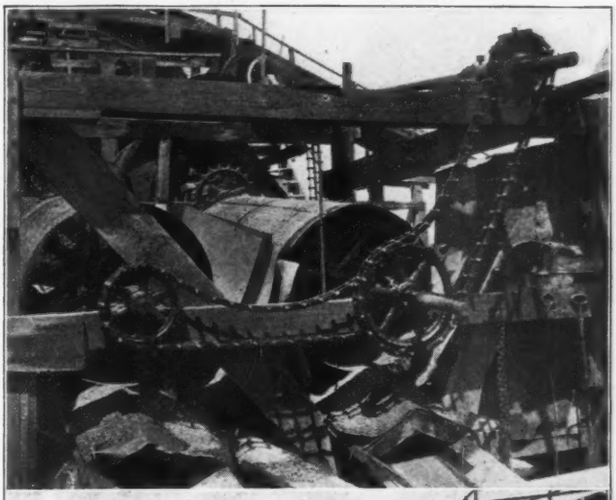
A 76,000 lb. locomotive with drivers 51 in. in diameter (cylinder 17x24), draws the cars. The company has two bottom dump cars of 80,000 lb. capacity, one of 60,000 lb., and a side dump car of 5 yd. capacity. The locomotive climbs a slight grade to the top of the receiving hopper, the capacity of which is limited to the load of a big car.

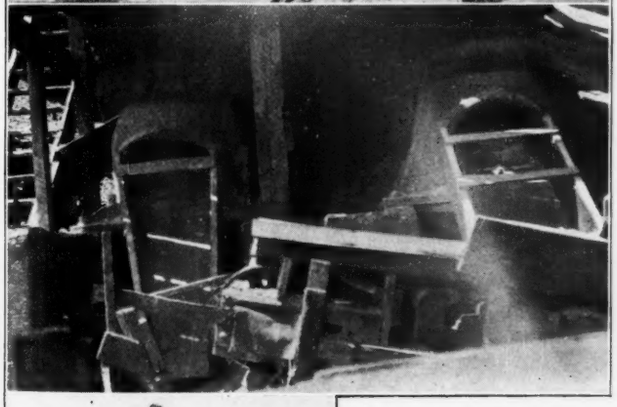
From the hopper the material is carried by the main belt (30 in. wide, 200 ft. center) to the top of the plant where the oversize is rejected by two separators and chuted to a No. 6 gyratory crusher. A secondary crushing follows immediately in either a No. 3 or a No. 4 gyratory which reduce the material to from

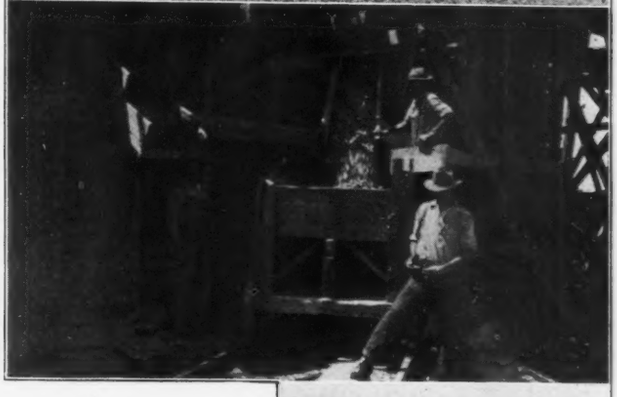


At left—The car loading side of plant, powerhouse in lower left corner. At right—The three gyratory crushers, screening plant and storage pile

Views of Coleman, Ill., plant of Richardson Sand Co.







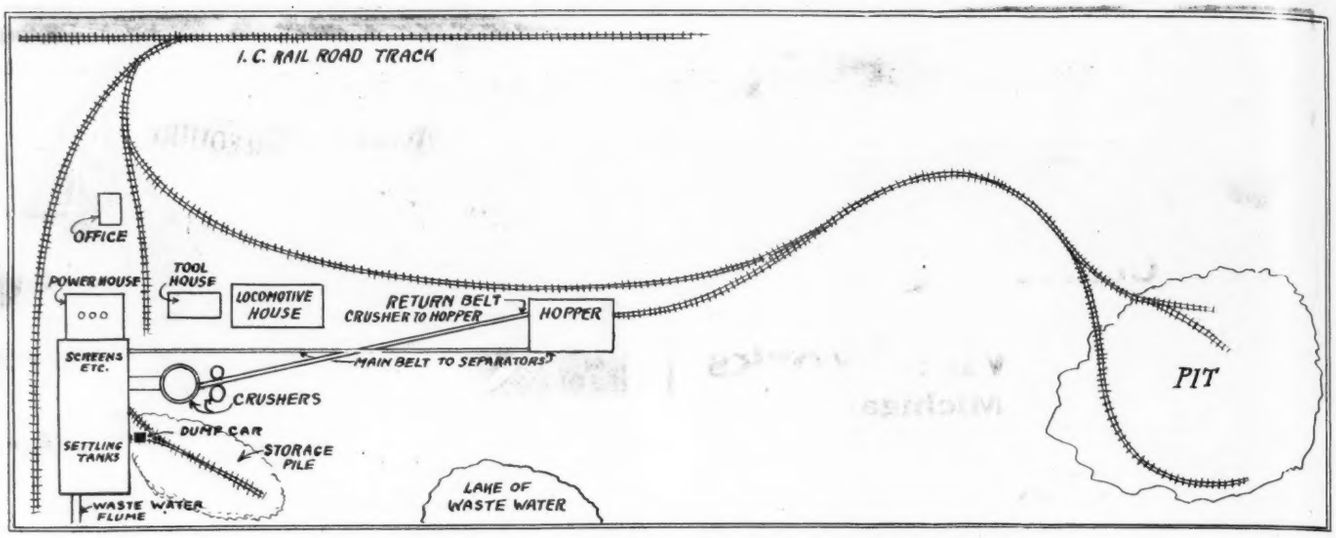
1—Hopper is below car and conveying belt is out of sight on other side of tender
2—High belt is main belt to separators. Low belt is return belt from crushers to hopper
3—The two lower and smaller crushers
4—Dump car unloading on storage pile

1—The screens just above the sand settling tanks

2—Loading dump car for storage pile

3—Close-up of the loading of car

4—Railroad cars loaded with sand ready for shipment



Rough sketch of layout of the Richardson Coleman operation

⅜ to 1¼ in. From this point the crushed material rides a 22 in. wide belt (180 ft. center) back to the receiving hopper from which it is carried again by the main belt to the top of the plant.

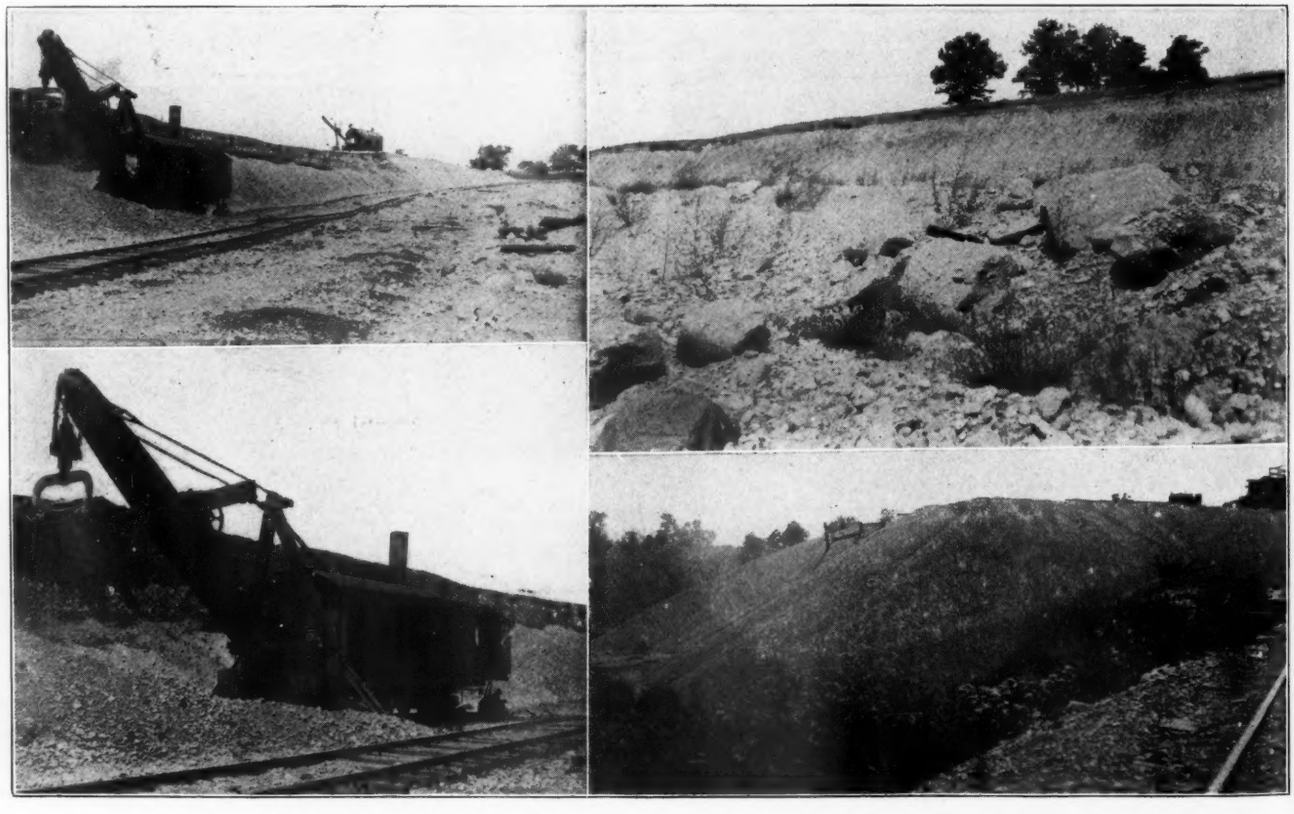
The material, 2 in. and less, passes the separator perforations and falls into inclined pans below, into each of which a stream of water is discharged from a 6 in. pipe.

The material is washed by gravity through four pairs of cylindrical screens providing sizes as follows: 1¼ to 2 in., ⅜ to 1¼ in., ¼ to ⅜ in., and sand less than ¼ in.

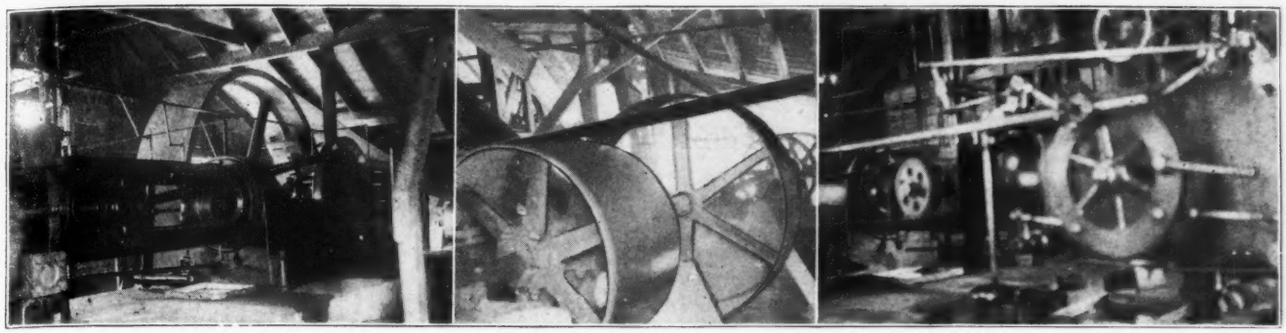
Reserve screen sets provide for other sizes. The plant does not produce fine sand, there being no demand on this plant for it.

The settling tanks are of the ordinary tilting wood type. In place of a valve, a common 8 in. bevelled pipe is used for the discharge. When the tank is in closed position the mouth of this pipe presses against a stationary timber.

The storage pile clings to the foundation of and the side of the screen and bin house, and spreads over an area of half an acre. It is about 34 ft. high. The material stored is of the largest sizes from 2 in. down. It is conveyed in a side dump car of 5 cu. yd. capacity, run on light rails from chutes below the screens, and at present over the top of the pile to its outermost edge. Three men supply the power to move the car. At one time the company used a conveyor belt, but this system was discontinued when the belt wore out.



At left—Views of shovels and pit. At right, above—Boulders in pit, and below, view of storage pile



Views of engine, main pulley and drive pulleys of Richardson steam plant

There is no special equipment for reclamation. When the demand for the material in the pile warrants it, one of the steam shovels, and a locomotive and cars are brought into service at this point. Rails are laid alongside of the pile connecting with the main tracks.

Steam operates all machinery. A 6x18 ft. boiler of 125 h. p. and an engine of 200 h. p. with a 42 in. stroke and a cylinder 14 in. in diameter constitute the power plant. A reserve boiler of equal capacity is maintained, permitting repairs without shutting down the plant. The main pulley has a diameter of 10 ft. and is about 30 in. wide. The shaft holding all the pulleys which direct the plant operations is 38 ft. long and rests on concrete foundations. For the screens the drive is rope transmission; belt is used for the other equipment. An engineer takes care of the power plant, doing his own firing.

The water supply comes from the Fox River through a 2,200 ft. pipe line. A boiler, steam engine and pump are housed on the river bank with a man constantly in charge. The intake of the suction pipe is 7 in.

The deposit now being worked formerly belonged to the Illinois Central railroad. It runs heavily to gravel, fully 75 per cent being coarse, some boulders of considerable size. There is a big proportion of oversize.

The screen and bin house is built of wood with reinforced concrete foundation. The company has a second locomotive (64,000 lbs.) used when business demands. Getting sufficient help in these days of reduced production is a problem. The company is short of labor and the superintendent, Gus Gunderson, is engaged in a round of unusual duties in consequence. The 10 hour day is in effect.

The Richardson Sand Co. operates another plant at Carpentersville, also near Elgin. The office is in the Chamber of Commerce, Chicago. F. M. Richardson is president and R. P. Duffy, secretary-treasurer.

Crushed Sandstone for Concrete Aggregate

WHEN ROANE COUNTY, W. VA., laid its first concrete pavement on the Spencer-Ravenswood Pike near Spencer, W. Va., in 1913, sand and pebbles used as aggregate were brought in by rail from the Ohio River. After considering carefully the cost of the work, it was found that the contemplated hard surface road program could not be carried to completion with the funds available unless cost of construction could be reduced by making use of local materials.

Adjacent streams were investigated as a possible source of sand for fine aggregate. Local sands were found and although they contained considerable clay and silt, they were made suitable for use after washing. Further investigation disclosed an unlimited supply of native sandstone, conveniently located with respect to the proposed roads. Physical tests of this sandstone indicated its probable suitability as coarse aggregate. It was therefore decided to try out this sandstone and sand in building a test piece of concrete pavement. The test section was built in 1914 and has been continuously subjected to a large amount of heavy steel-tired traffic, hauling heavy machinery and supplies both to and from the oil fields. Careful observation of the pavement indicates wearing qualities equal to concrete built of imported and more costly aggregates. In addition to these 12 miles, the county proposes to build 18 additional miles this year and also to make use of local materials.—H. R. Muldoon, County Road Engineer, in July issue of the "Concrete Highway Magazine."

Detroit Street Railways Run Own Ballast Plant

IN AN EFFORT to effect large economies the Detroit United Railways placed in operation last year a crusher plant for the production of concrete aggregate and ballast. It was estimated that about 25,000 cu. yds. of the latter material would be needed in a normal year for the construction and maintenance of interurban lines. It was believed that 15,000 cu. yds. of this could be furnished from salvaged waste material such as broken concrete, old brick, and paving block, material which formerly had been for the most part hauled to a dump and used for filling in. Practically all the material crushed is waste material and is used for interurban track ballast. One foreman and three men operate the plant and with dump cars can handle 500 cu. yd. per day.

What the Consumer Pays for in Buying Sand

WHEELING, W. Va.—The following explanation, says the Wheeling Majority, has been given the Chamber of Commerce by the Wheeling Wall Plaster Co. in explanation of why sand and gravel prices are higher in Wheeling than in Steubenville:

Steubenville has a river hopper centrally located, into which the material is delivered direct from barges by machinery. Wheeling possessed the same equipment and facilities at 24th Street until the unfortunate and destructive ice break-up in January, 1918.

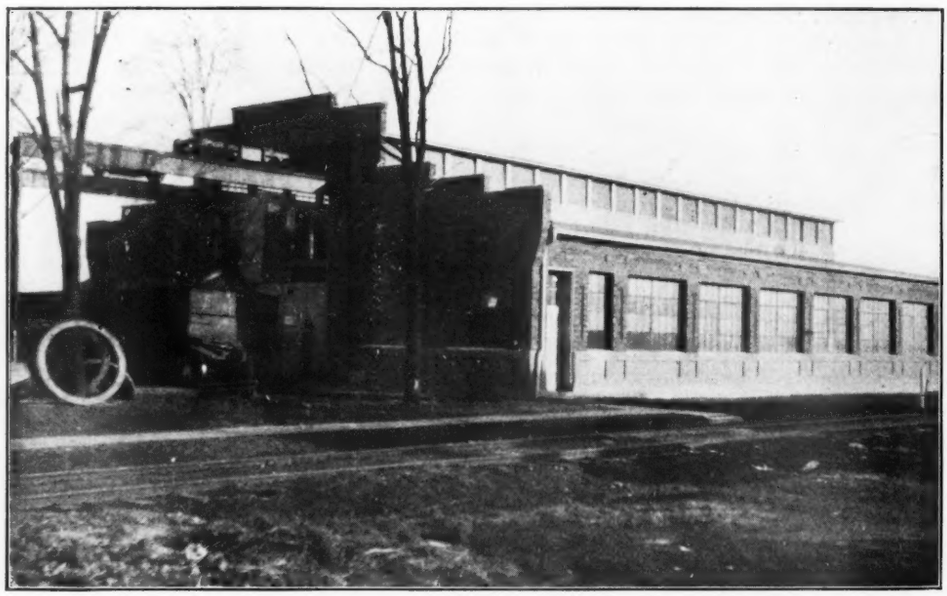
The Wheeling dealers are obliged to have the material shipped into their yards in carloads, paying freight, providing storage yards and bins, labor unloading and reloading on trucks, together with a longer truck haul.

The Wheeling dealers pay an average of $1.40 per ton, f. o. b. cars their yards, including freight. Yard and bin cost is 5c per ton. Unloading and reloading cost is 20c per ton. Average trucking cost in the Wheeling district is 90c per ton. Office and administration cost is 10c per ton. This makes a total cost to the dealer of $2.65 per ton.

The Acme of Gravel-Plant Repair Shops

Greenville Gravel Co. Has Manufacturing Subsidiary, the Prime Purpose of Which Is to Keep Ten Plants in A-1 Shape

THE GREENVILLE GRAVEL CO., with headquarters in Greenville, Ohio, is probably the largest sand and gravel operator in this country. It is now operating 10 plants in the states of Ohio Michigan and Indiana. The head of this company, F. D. Coppock, has always been noted for introducing original ideas and practices into the industry. His latest move was the establishment of the Greenville Manufacturing Co.



Plant of the Greenville Manufacturing Co., Greenville, Ohio

All sand and gravel plants have to have repair shops, even if only a "forge in the forest." Many have excellently equipped machine shops, but probably the Greenville shop represents the height of the ambitions of sand and gravel plant operators along these lines.

The manufacturing company is a subsidiary of the Greenville Gravel Co., and was primarily intended to devote its attention exclusively to the repair and manufacture of gravel washing and screening machinery for the gravel company. The field of endeavor of the concern, however, has during the few months of its operation been considerably broadened. In addition to doing the repair work for a large number of sand and gravel producers in Western Ohio and Eastern Indiana, it has likewise taken on business outside of the sand and gravel machinery.

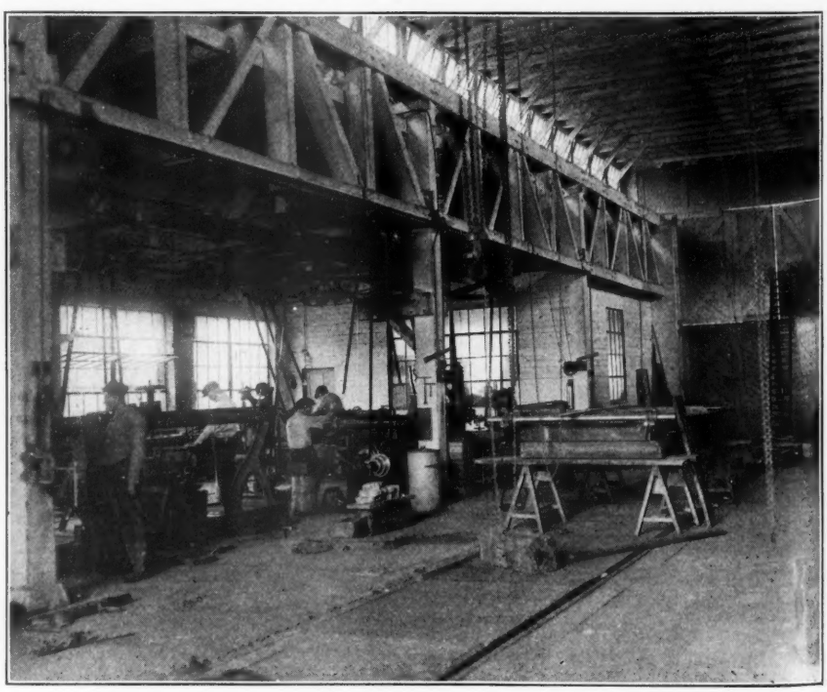
The factory building itself is of brick, steel and concrete, and modern in every respect. The company is equipped to rebuild and repair locomotives of any type, size or construction. It is equipped to completely overhaul and put in condition steam shovels, railway cars, locomotive cranes, and other types of large machinery. It is in fact a general machine shop prepared to do all kinds of heavy or light machine and steel work and certain character of structural steel work as well as all kinds of plate, steel and forging work.

It has installed the most modern and improved type of acetylene generating plant, and makes its own acetylene gas, enabling it to do the most modern and approved type of acetylene welding and cutting.

The company has installed a 265-ft. capacity air compressor served by a large variety of air drills, hammers, cutters, grinders and other pneumatic tools. It is equipped with electric drills suitable for large and small work.

Another item of notable interest is the 16-ton traveling crane which operates the full length of the building and extends 33 ft. outside of the building over the Pennsylvania tracks. In addition to this, it has several smaller hoists, cranes, derricks and trolleys for handling large pieces of equipment expeditiously.

The plant is served by the Dayton & Union (Baltimore & Ohio) R. R., by a siding into the building, and from the Pennsylvania by a siding running adjacent to the



Interior view of machine shop of the Greenville company

north end of the building. Besides these sidings there are several other side tracks and spurs giving storage space for out-door work.

It is equipped with gas furnace and torches for acquiring high temperatures necessary on machinery requiring such treatment.

A part of the space of the building is devoted to a stock room, serving as a distributing point for repair parts for the different plants of The Greenville Gravel Co., and including bolts, rivets, shafting, steel plates and bars.

Engine lathe and portable crane are part of equipment

The installation of modern, high-class lathes, planers, shapers, drill presses, thread-cutting machine, 200-ton hydraulic press, milling machine, punch, shear, etc., enables the management of the factory to handle most any kind of work in connection with steel and machinery.

F. D. Coppock, president of the Greenville Gravel Co., is likewise president of the Greenville Manufacturing Co. F. M. Welch, formerly with The Webster Manufacturing Co., of Tiffin, O., is the manager of the company.

German Potash Syndicate Would Double Its Price

THE German potash syndicate has petitioned the Government to grant permission to raise the price of potash 100 per cent, owing to the increased cost of production, says a dispatch from Weimar, Germany. The syndicate claims to have a deficit of 46,000,000 marks for the first three months of the year and declares it will be forced to shut down unless it can increase its selling price.

Overburden Is a Saleable By-Product of These Pits

TO TALK of by-products of a sand and gravel plant, to many may be like talking of a dream of optimism. However, some kinds of pits do have one by-product, ice, a winter harvest, made possible by springs which feed the pit.

But the Inter-State Sand & Gravel Co. of Chicago has another, the overburden. It finds the overburden a very marketable by-product; in fact the demand exceeds the supply. The stripping facilities at the plant near Libertyville, Ill., were made of course merely to facilitate sand and gravel production. But along comes the Great Lakes Training Station and asks for good black dirt with which to top-dress the station's fields and to grow grass on.

The order has kept the company's stripping crew busy and yet if President Burton H. Atwood were to attempt to supply the whole demand it would require additional machinery. So it is evident that the overburden to be classified as a commercial asset must be the right kind of soil. As the Inter-State obtains its sand and gravel by drag-line below the water line, there is the other by-product possibility.

What the Inter-State takes out and ships away as sand and gravel is replaced by fine spring water which forms a lake, adding another product, ice, that can keep the employees going in winter.

Among other concerns the Chicago Gravel Co. also sells its overburden from the Plainfield pit. It is used for improving lawns.

Flint, Mich., Gets Ten Cents Freight Reduction on Sand

TRAFFIC MANAGER Frank G. Pick of the Board of Commerce of Flint, Mich., has received a supplement which announces a reduction in the rates on sand and gravel from the pits at Eastland and Otisville, Mich., of 10 cents a ton, effective June 11.

This reduction is the result of constant effort on Mr. Pick's part dating back to last fall. It means much to Flint builders and contractors and to the city and county alone will effect a saving of $1,000 in freight charges for the season of 1919.

This reduction must not be confused in any way with the additional 10 cents discount on sand and gravel when the freight charges are paid by municipalities, but is a straight reduction on all sand and gravel for all shippers from those points from 70 cents to 60 cents, which rate should be effective on all such material accepted on or after June 11.

Railway Men Give Heed to Individual Rate Appeals

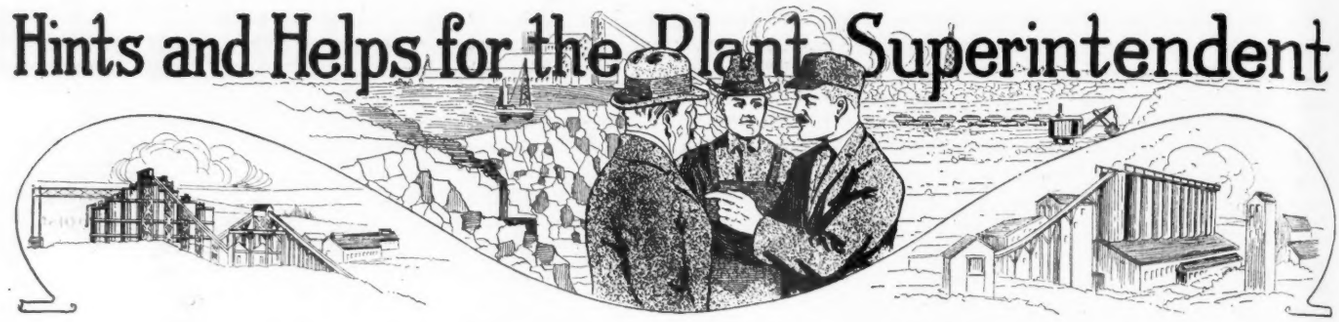
THE RAILWAY TRAFFIC people are coming to see the necessity for a wider range of rates on these commodities (sand, gravel and crushed stone), and the requests of individual shippers are receiving much more favorable consideration than was given a few months back, says the Illinois Sand & Gravel Producers Bulletin.

Agricultural Bureau of the Lime Association Adds to Staff

SIDNEY P. ARMSBY, son of Dr. H. P. Armsby, Director of the National Institute of Animal Nutrition at State College, Pennsylvania, and a graduate in chemistry of the latter institution, of some years standing, has joined the staff of the Agricultural Bureau of the Lime Association, according to an announcement by General Manager Hall. Since graduation, Mr. Armsby has had a varied experience in routine chemical lines, touching agriculture and some of the metal industries reaching up into the administrative side. For three years he successfully managed an orange plantation in Florida and built up the soil by the use of up-to-date soil management including green manures, fertilizers and lime. Lately he has been in the army where he acquired responsible experience in charge of the construction and maintenance of chemical manufacturing plants for the Chemical Warfare Section.

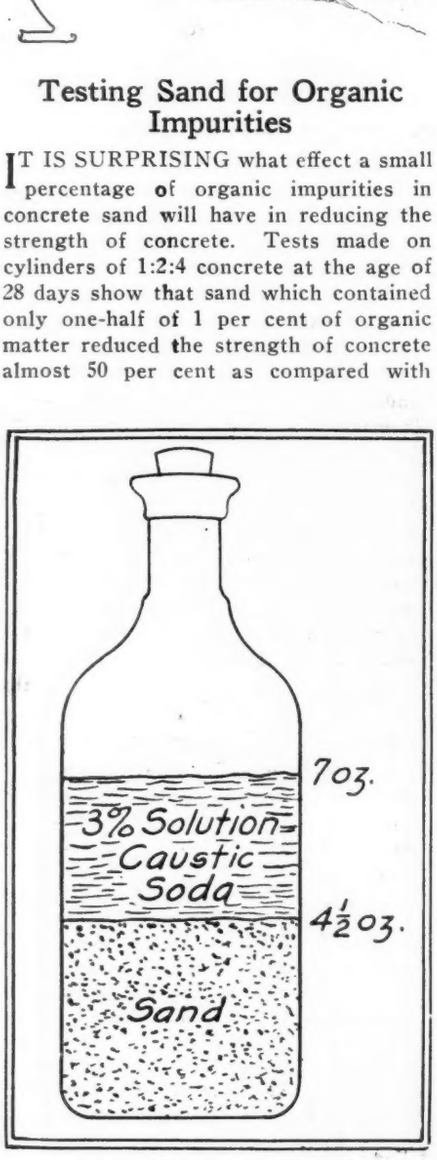
He comes through the special financial co-operation of the member producers in District 5, namely, Virginia, North and South Carolina, and will therefore take up field work in that district as a representative of the Lime Association.

Hints and Helps for the Plant Superintendent



Testing Sand for Organic Impurities

IT IS SURPRISING what effect a small percentage of organic impurities in concrete sand will have in reducing the strength of concrete. Tests made on cylinders of 1:2:4 concrete at the age of 28 days show that sand which contained only one-half of 1 per cent of organic matter reduced the strength of concrete almost 50 per cent as compared with concrete made with sand of the same character but containing no organic impurities.



How sand may be tested

A simple test has been developed for determining whether a particular sand contains sufficient organic impurities to make it unfit for use in concrete. This test is one that can be made by anybody, and in a short time. A 12-ounce graduated prescription bottle is filled up to the 4½-ounce mark with the sand to be examined; then a 3 per cent solution of caustic soda is added until the level of the liquid reaches the 7-ounce mark. The bottle is corked and shaken thoroughly and then set aside for 24 hours.

By observing the color of the liquid, the quality of the sand for concrete may be determined as far as the presence of organic impurities is concerned. If this liquid shows practically clear or not darker than a straw color, the sand may be considered as sufficiently free from organic impurities to be used in all classes of concrete work. If the liquid is more nearly a dark amber color, the sand should not be used for concrete excepting where the work is relatively unimportant. If the liquid is darker than this, the sand contains too large a percentage of organic impurities and is unfit for use in concrete.—Portland Cement Association.

Question Box

GOT a problem you want help on? Send it in. We will agree to find some operating man who can answer it.

Secondary Crusher Settings

IN MANY SMALL PLANTS of course one crusher can be made to do the re-crushing as well as the primary crushing, but where a re-crusher is installed or to be installed it certainly pays to do a little studying to get the most efficient layout for the given conditions.

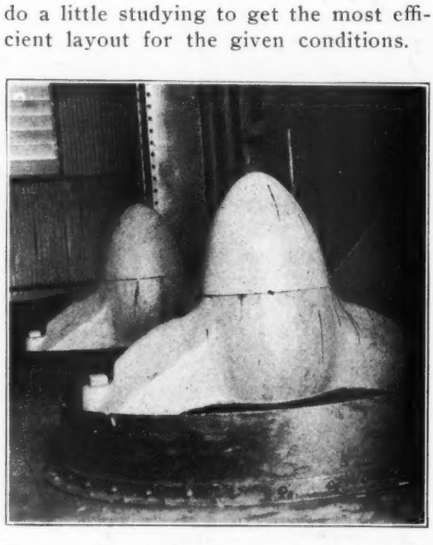


Fig. 1—Up-to-date secondary crusher setting

In order that the crusher itself, as well as the conveyors, elevators and screens that follow it may be as uniformly loaded as possible it is best to feed the re-crushers from bins, as is done in the installation shown in Fig. 1, which is one of the very newest and best. A method of feeding crushers without bins is shown in Fig. 2, where feed boxes from 2½ to 3 ft. high are built over the crusher aprons. This method takes care of sudden spurts of material, but is inferior to a bin feed.

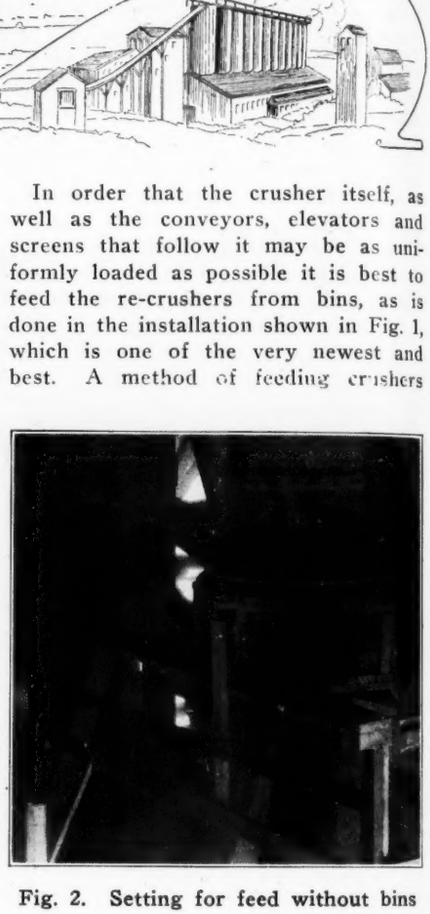


Fig. 2. Setting for feed without bins

Novel and Cheap Stock-Piling

By R. W. Scherer, Gen. Supt. of Quarries, Union Lime Co., Milwaukee, Wis.

A STOCK-PILING PLANT that meets the requirements of many stone and gravel plants which need to accumulate a surplus produced in spring for shipment in the late summer and fall is being installed by a progressive Wisconsin gravel plant. The considerations leading to the adoption of what might appear at first sight as a cumbersome plant, will prove of interest to all who are contemplating such an installation.

The primary object is, of course, ultimate economy and to secure it, interest on investment and operating expense were taken into consideration. It is clear that if there is almost constant filling and reclaiming, these processes had better be made automatic and cheap

though the machinery to do this requires a larger investment. If the surplus pile is filled and emptied weekly or monthly there must be machinery or gravity to do this at a small operating expense per yard; but if this reserve of finished product is to be handled only once or twice per season the investment in bins or conveying machinery becomes high per yard of contents of the pile.

For constant handling, bins are certainly the cheapest to operate, but the most expensive to construct. This plant was already provided with bins for handling 20 carloads—two days' production. A reserve pile of 5,000 to 6,000 yards was required and will be secured by constructing a trestle carrying a dump car and cable. It is very usual to use a belt conveyor for this purpose, but it was discarded in this instance because the total length of trestle required is 290 ft. and two kinds of material would have to be piled simultaneously, requiring two belts at a large first cost, as compared with the car and cable.

As designed the car can be operated by one man who would otherwise be idle when the product can not be shipped and must be diverted to the stock-pile. He would be employed at this probably less than a total of 200 hours during the season, at a cost of $80, and it was concluded that no two conveyor belts of any kind could be kept up per year at this cost, even when housed. As far as placing in stock-pile is concerned, both investment and operating are lower for a car and cable than for the conveyor belts. Labor-saving devices even in times of high labor costs can be overdone.

The capacity of these piles is approximately 2,000 yards of sand and 3,500 yards of gravel. The trestle, in order to make it shorter, rises at an inclination of one foot in ten and this incline will also serve to bring the empty car back to the bin without power. There being sufficient ground space the piles can be held separate by placing them far enough apart instead of building a retaining wall between the two kinds of material. Twenty additional feet of trestle, if the ground space is available, will obviate the necessity for a dividing wall 10 ft. high at much less expense.

The bins in the plant are tapped for storage on the pit side, for car loading there are spouts on the other side, the track side, of the bins. This brings the trestle a distance from the railroad cars, equal to the width of the bin building, plus the clearance. As the trestle rises, the piles that can be deposited under it become higher and wider. At its outside end the trestle is planned 40 ft. high and must be kept 40 ft. from the railroad tracks to allow for both sand and gravel to take their natural position of 45 degrees and not require a retaining wall at the side track.

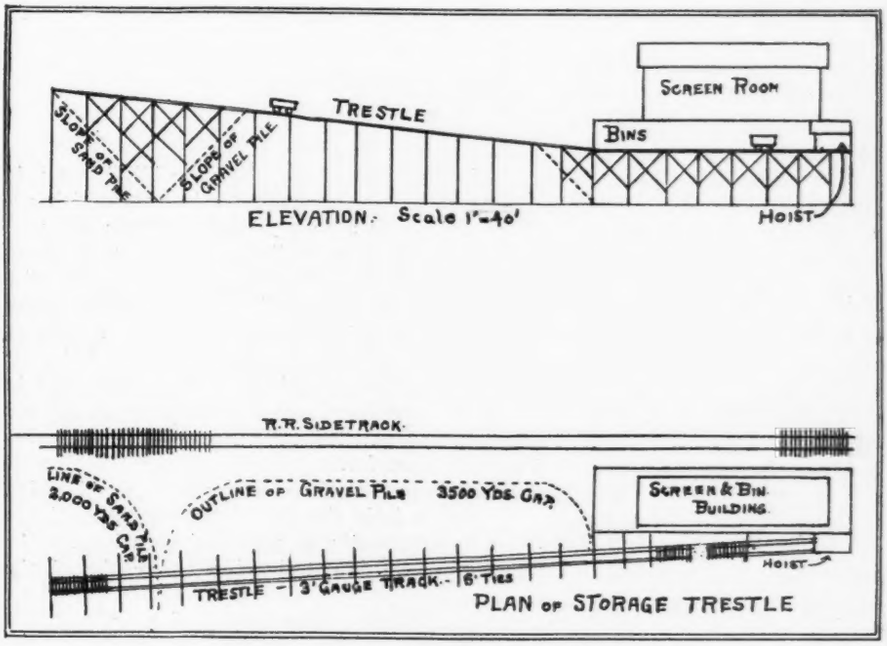
In designing the trestle, which requires about 16,000 f. b. m. of timbers, thought was had for the invariable tendency of such piled material to tear down all cross braces, however, they may be fastened. Braces and stays placed on the bents of the trestle where they are buried in stone are so sure to be wrenched loose by the burden of material that their use must be avoided. Braces are placed only where they will be free from the piles. The end of the trestle will be held by guy wires.

Loading from this stock-pile will be done with a 60-ft. self-contained belt conveyor on which material will be placed by a power loader, both electrically driven. Two men will be required for this work and these would again be otherwise idle, since the stock-pile would be used mostly when there is no production. This method of reclaiming is no more expensive than the better known one of the belt conveyor in a tunnel under the pile, requires no more investment and has the added advantage of being able to reclaim all the pile and of enabling the men to move even frozen material when necessary. Through a tunnel only half the pile can be reclaimed and in winter time the gates are invariably frozen tight or clogged by lumps of frozen stone. Sand is troublesome to get through a tunnel even without frost.

The dump-car will be "home-made" and is designed to spill both kinds of material free from the 6-ft. trestle. It is of the swing-side type with gable roof floor. The swing sides are closed by means of a latch. Bolts of two different lengths are provided for the latch, one length to be engaged by a tripping device at the gravel pile and the other shorter length or bolt by the tripping device at the sand pile at the extreme end of the trestle. By inserting these different lengths of bolt before loading and hoisting the car the operator can control the point of dumping and can handle these two kinds of material or more if necessary, without leaving the working platform, the electric hoist being also placed at the end of this working platform, the lower end of the trestle. The car has a capacity of 40 cu. ft. and it is estimated that with one operator loading by large spouts from the bins and having the electrical hoist near at hand, 50 to 60 yards per hour can be carried to the piles.

The estimated cost of the installation is $2,500 for trestle, car and hoist, $200 for the reloading machinery. A total of $4500 for the 6000 yards of capacity, 75c. per yard. Operating costs are less than 2c. per yard for placing and less than 3c. for reclaiming. The total cost, interest and depreciation plus operating is under 14c. per yard, if the full capacity is utilized only once per year, proportionately less if used oftener. Where a greater quantity needs to be accumulated or where the device is used more frequently than once or twice a season, a higher investment to secure cheaper operating is advisable, but for these requirements, a spring surplus of 6000 or more yards is carried to fall, there is no more efficient or cheaper device.

And there can also be no doubt that it is worth 14c. per yard to acquire and have ready for shipment such a surplus. Its production, utilizing as it does time otherwise lost in an expensive plant, has cost very little. To the operator it is service insurance for his customers, in tiding over breakdowns, car shortages and the many other aggravating delays.



Simple and economical stock-piling device

TNT as a Blasting Explosive

Great Quantities of War Product Can be Put to Industrial Uses—Is Not More Dangerous to Handle than Ordinary Dynamite

By Charles E. Monroe and Spencer P. Howell
United States Bureau of Mines

TNT is an explosive which is obtained by acting upon toluene with nitric acid in the presence of sulphuric acid. Toluene is a liquid substance which is produced from soft coal in the process of making coke, coal gas and coal tar and it is recovered for use from both the gas and the tar. It is also made in other ways. The name TNT is an abbreviation for trinitotoluene, which is the name given by chemists to the explosive in order to state its composition, while designating it and to thus distinguish it from many other nitrotoluenes known to them.

History

TNT has been known to chemists since 1863 and it was adopted as a military service explosive by 1902, but it did not become widely known until the great war, when it came to be extensively used as bursting charges for high explosive shells, depth bombs, mines, torpedoes and other devices, and in demolitions where very violent detonation effects were sought to be produced with the largest measure of safety from these effects to the users. It was also used in admixture with other substances to produce other military explosives such as amatol and sodatol.

Safety

Because of the devastating effects produced by the explosion of these devices charged with TNT and because of the many most disastrous accidents which have occurred during the manufacture and transportation of large quantities of TNT under the hurried conditions necessitated by war conditions, many have been led to conclude that TNT is an especially dangerous explosive; but it really possesses characteristics which render it less dangerous than many explosives generally used in our industries. Thus it has been found more difficult to explode it with certainty than nitroglycerin, dynamite or gun cotton. In fact it was considered so safe that in 1910 the British Government, on advice of its explosive experts, issued an Order in Council exempting it from being deemed an explosive, and subject therefore to the Explosives Regulations, during manufacture and storage unconditionally, and when conveyed and imported provided it was properly packed. But this order has since been rescinded and it may be proper to say in this connection that all substances possessing explosive properties should be treated with special care and surrounded by safeguards.

Industrial Use

With the cessation of hostilities this country found itself with very large supplies of TNT on hand. So large indeed that it was deemed unwise to keep all of it in storage awaiting future military use, and it was proposed to devote many million pounds of it to industrial use. Now, although nitrotoluenes in admixture with other substances have been used as industrial explosives to a certain extent for more than a decade, TNT as such, for several reasons, and especially because of its value as a military explosive, has not been used in industrial blasting except tentatively. It is not surprising therefore that objections should have been made to its suggested use as an industrial blasting agent and doubts expressed as to its operativeness. It is the purpose of this paper to show how TNT may be safely and efficiently used in industrial blasting operations by those skilled in blasting and to correct many erroneous or misleading statements which have been circulated as to the properties of TNT, by giving the results of careful experiments and observations, many of which have recently been made at the Bureau of Mines Experiment Station.

General Characteristics

When chemically pure TNT is a pale yellow, crystalline substance which acquires a deep yellow to brown color on exposure to light. It melts at about 80.5°C. (177.9°F.) and when in the molten state it is cast into shells or run into cold water where it is granulated by chilling in the form of pebbles or pellets. TNT may therefore appear in granulated crystalline form, in pebbled or pelleted form or in blocks or other cast forms. As offered by the Department of the Interior for use in blasting it is in the granulated crystalline form. Naturally, as produced on a large scale, TNT is not chemically pure, though the admixted substances are principally other nitrotoluenes which do not materially affect the explosive quality of the product though they do change its appearance and other physical characteristics.

Thus the War Department secured and has alloted to the Department of Interior for industrial use three grades of TNT as follows: Grade I having a setting point (S. P.) of 80°C. (176°F.); Grade II, S. P. 79.5°C. (175.1°F.) and Grade III, S. P. 76°C. (168.8°F.), the setting point of the molten TNT being employed by the Ordnance Corps, U. S. A., as the criterion of purity because it is more readily observed with accuracy than the melting point of the solid is. This Grade I appears as a dry granular crystalline powder, having a slight yellow color, and so fine that it will pass through a 30-mesh sieve. Because of its dryness it readily gives off dust; Grade II as a granular crystalline powder resembling light brown sugar with a reddish tinge in color and so fine that it will pass through a 12-mesh sieve. It is less dry and therefore less free-running and dusty than No. I; and Grade III as a dry crystalline granular powder having a pale sulphur-yellow color, and so fine that it will pass through a 12-mesh sieve. It is not dusty, has the consistency of brown sugar, looks as if it were slightly moist, or greasy, and shows a tendency to cake, and is less free-running than No. II.

Solubility and Hygroscopicity

TNT is almost insoluble in water. According to Marshall, water at 15°C. (59°F.) dissolves 0.021 per cent of it and at 100°C. (212°F.) 0.164 per cent. That is 100,000 parts of water at 15°C. dissolves 21 parts of TNT and at 100°C. 164 parts. The solubility of the different grades mentioned above is of the same order as this. In fact the lower grades and especially Grade III, have a greasy feel and appearance and are, to a degree, water repellant. The proved solubility of TNT shows that it cannot be deliquescent or more than slightly, if at all, hygroscopic. Investigation at the Bureau of Mines Experiment Station has shown that it absorbs moisture when exposed to the atmosphere to about the same extent as powdered glass. This is for all practical purposes an entirely negligible quantity.

Packages

Military TNT, as offered for use in industrial operations, is packed in the granular crystalline form, in boxes made of white pine 5/8 in. thick. The boxes are lock-cornered construction and lined

with paraffined paper. Most of the boxes of TNT received at the Explosives Experiment Station of the bureau were 22⅜x15¼ by 13 in. outside dimensions and occupy a volume of 4436 cu. in. (2.57 cu. ft.). The boxes contained 100 lbs. of TNT and their gross weight averaged 113 lbs. It is possible that the boxes supplied by other manufacturers differ in dimensions and weight from these. The tops and bottoms are fastned on with nails. In opening the boxes, if force is necessary, the covers should be pryed off with wooden wedges. Grades II and III tend to cake during storage and the lumps must be broken up to render the explosive "free running" so that it may be made into cartridges or loaded directly into bore holes. They may be broken by pressing them with a wooden paddle or striking them light blows with a wooden mallet on a wooden surface.

Poisoning

TNT has a faint smell and a bitter taste. It produces brown stains on the skin which are difficult of removal. It is toxic and may produce poisoning by being inhaled as dust, or taken into the mouth or by absorption through the skin; but unlike nitroglycerin, which produces severe headaches if but even a minute quantity touches the skin, rather long contact with TNT is required before its toxic effects become of moment. Nevertheless those engaged in handling it, crushing the lumps and loading it into cartridges should avoid getting it into the nose and mouth and clean their hands thoroughly before eating.

Detonation

TNT is more difficult to detonate with certainty than nitroglycerin, dynamite or the explosives ordinarily used in quarrying. TNT charges require a No. 8 detonator (blasting cap) or electric detonator, while dynamite and the other high explosives ordinarily used in industrial operations require but a No. 6 detonator. Objection has been raised to the use of TNT on the ground of the increased cost consequent on the use of this stronger detonator. From inspection of current price lists it appears that No. 8 detonators cost nine-tenths of a cent more apiece than No. 6 detonators and that No. 8 electric detonators cost 1.7 cents more apiece than No. 6 electric detonators do.

Sensitiveness

As shown by tests with the pendulum friction device, all the three grades of TNT are less sensitive to friction than 40 per cent straight dynamite, gelatin dynamite or picric acid, and as shown by tests with the large impact machine all are less sensitive to percussion than 40 per cent straight dynamite, amonia dynamite and nitrostarch powders. It may be set on fire, when it will burn, but this burning may change to a detonation. Hence TNT must be protected from fire and causes of fire, such as sparks, flame, heated bodies, friction, percussion and the like, as all explosives should be at all times.

Gaseous Products of Detonation

In tests made at the Pittsburgh Experiment Station by detonating TNT, Grade I, and collecting the gases it was found that 454 grams (one pound) of the explosive gave 506.5 liters of gases. chiefly carbon monoxide, hydrogen and nitrogen. The tests of other grades of TNT gave similar, though not identical results, but all indicate it to be unsafe to use TNT in close places, such as underground workings, because nearly half the gas formed is carbon monoxide —an exceedingly poisonous gas. These results emphasize the importance of remaining away from the face of the blast after the explosion until assured that the gases produced have been blown or have diffused away from the interstices of the debris. The safe waiting time will, of course, vary with the quantity of explosive fired, the location, such as a pocket or valley or plain, and the atmospheric conditions, particularly that of the force and direction of the wind. These precautions are such as should be taken with all explosives.

Relative Efficiency

In determining the relative efficiencies of explosives in use, the Bureau of Mines has long employed the "unit deflective charge" and the "rate of detonation" as criteria. The unit deflective charge is ascertained by exploding a known weight of the explosive in the ballistic pendulum and this term "unit deflective charge" is defined as "that weight of an explosive which will swing the ballistic pendulum the same distance as one-half pound of 40 per cent straight nitroglycerin dynamite." It appears that the less the unit deflective charge, the greater the propulsive capacity of the explosive; hence, this is considered a measure of the ability of an explosive to dislodge and bring down material in which it is exploded. These tests show TNT to be from 9 to 14 per cent more powerful than 40 per cent dynamite.

Rate of Detonation

The method of determining the rate of detonation is to charge the explosive in a file 1¼ in. in diameter and 42 in. long at normal density (that is, no unusual effort is made to get the explosive to a high density) and to fire the charge with a No. 8 electric detonator.

The "rate of detonation" is considered a measure of the ability of an explosive to disrupt and shatter material in which it is exploded.

The results of such tests show approximately the same rate of detonation as 40 per cent dynamite.

Packing in Cartridges

Comparisons made in the unit deflective charge were by weight and in the rate of detonation by volume. When either of the three grades of TNT are packed in cartridge cases or in bore holes under ordinary tamping pressures, the apparent specific gravity of the charges varies from 0.81 to 0.95, while when 40 per cent straight dynamite is so packed, the apparent specific gravity of its charges is from 1.15 to 1.34. It is evident, therefore, that for equal weights the TNT cartridges will be more bulky than the dynamite cartridges. As a consequence of this, larger bore holes must be used for TNT charges than for dynamite charges of equal weight. This presents an advantage for the dynamite over the TNT, but on the other hand, it has been observed that as the apparent specific gravity of the TNT approaches the lower limit (0.86), its resistance to wetting, when the cartridges are immersed in water, increases.

Hence, it is recommended that except in assuredly dry holes, or in big blasts, where full boxes of the explosive may be fired in chambers, the TNT be packed for use in cartridges and that, as the No. III Grade is the most water resistant of them all, it be packed at a low pressure and reserved for use in the especially wet work. To particularly distinguish the cartridges of Grade III, the wrappers may be of a specially chosen color, or better yet, they may be packed in paraffin coated wrappers and after the charge has been packed in these wrappers and the ends folded in, the ends should be redipped in the molten paraffin to completely seal them. For emergency use, newspaper may be employed for wrappers, being made up into cylinders of the desired dimensions by rolling about a pick handle or other convenient tool, but where considerable quantities are to be packed, it will be better to make a regular job of the operation, and to pack the explosive in the standard manila wrappers, made by means of a cartridge machine.

Precautions To Be Taken in Packing

It is only in less large scale operations of crushing and repacking TNT into cartridges that there is much likelihood of any one becoming poisoned, for as a rule, it requires continued contact with it through some period of time to produce this result. In handling TNT the following rules should be observed:

1. Only persons in good health should be employed.
2. Special clothing should be provided

to be used only during working hours. Gauntleted gloves may be worn, but this is not necessary.

3. The hands and face should be washed before meals and before leaving the factory.

4. Care should be taken that none of the TNT comes in contact with the mucous membrane, such as that of the mouth, nose, eyes, etc. Workers should, therefore, be cautioned against touching these parts with their hands, or taking a chew of tobacco.

Cases of TNT poisoning which have occurred in considerable numbers in the factories operated under war conditions, appear to have resulted from neglecting to observe all the foregoing rules.

This poisoning is usually first evidenced by the appearance of a rash on the hands, neck or face. When this occurs, the case should receive prompt medical attention, and it would be desirable to transfer the person to other work. In this way, a worker who is easily susceptible to TNT poisoning will not be exposed to further danger. In factories where the opportunities for TNT poisoning are great, the effects are not usually evidenced until after five weeks of work.

Charging Bore Holes

TNT should be charged into bore holes primed, tamped and stemmed in the manner customarily followed in the use of high explosives in blasting, special care being taken in charging wet holes, not to tear or break the cartridge case or wrapper while loading it into the hole and tamping it. It may be used in chambering holes for subsequent charging with black blasting powder, just as dynamite is used. When TNT shots are fired, if the detonation is complete, there will be produced large volumes of dense black smoke.

Water Resisting Properties

Since some blasting must be done in damp or very wet holes, it is desirable to know the water resisting properties of the different grades of TNT when compared with such well-known commercial explosives as 40 per cent "straight" nitroglycerin dynamite and 40 per cent strength ammonia dynamite. One and one-fourth by eight inch cartridges of Grade I, Grade II and Grade III TNT and the two dynamites were submerged in thoroughly wet sand in pans at room temperature for definite periods of time and attempt made to detonate each cartridge when confined in sand in a borehole. No. 6 electric detonators were used with the TNT and the dynamite. If complete detonation occurred in each of three trials, the explosive was considered as having sufficiently resisted the water.

The dynamites were tested as received and also after the wrapper was punctured with 16 small holes to simulate a broken cartridge. The ammonia dynamite had the appearance of being redipped by immersion in paraffin while it appeared that the "straight" dynamite had the machine crimped end (the one last closed) sprayed with paraffin. Each grade of TNT was tested in three types of cartridges—newspaper, paraffined paper with one end redipped and paraffined paper with both ends redipped. The TNT cartridges were tested with and without the puncturing and packed both hard and easy into the cartridges. The tests were made at the Explosives Experiment Station of the bureau by Edmund Stein.

Conclusions

When both ends of cartridges of all grades of TNT are redipped and not punctured, they withstand water fully as well as the dynamites when tested as received. This shows the efficacy of this type of cartridge and is independent of the nature of the explosive within the cartridge.

Grade III TNT in cartridges resists water for 1 to 72 or more hours, the time depending upon the density at which packed and the nature of the cartridge. In all cases with Grade III TNT, the cartridges which were packed easily withstood the water better than those which were packed hard. Grade III TNT has very much better water resisting properties than either of the other grades of TNT, and especially so, when packed easily and compare very favorably with the dynamites tested.

Of the three grades of TNT, the only one recommended for use in wet holes in cartridge form is the Grade III. The others may be used for wet work if packed in completely redipped paraffined cartridges, provided they can be charged without breaking the cartridges.

Demand for Glass and Glass Sand Continues in Spite of Prohibition

Japanese Offer Serious Competition in Laboratory Glass

By R. B. Ladoo, U. S. Bureau of Mines

IN SPITE OF THE approach of national prohibition the demand for certain lines of glassware nominally used in the dispensing of beverages now banned has continued. In addition, a new demand has arisen in unexpected volume for glassware to be used in the serving of soft drinks. This class of trade is now demanding an even better quality than was commonly sold for bar service. It is expected that soft drinks and near-beers will greatly increase in popularity and this new trade should eventually largely replace that lost in beer and liquor bottles.

Japanese Competition in Chemical Ware

The manufacturers of chemical glassware in this country fear that the importation of the Japanese laboratory glassware will greatly endanger the American industry. It is claimed that labor costs alone in this country nearly equal the selling price of the Japanese goods. A committee of chemical glassware and porcelain manufacturers has urged the Ways and Means Committee of Congress to levy a 60 per cent ad valorem tariff on imports.

While Japan is usually at a disadvantage in the cost of fuel, the labor cost is very low in comparison with our standards. In 1917 the average daily wages paid in glass factories were 38 cents for males and 17 cents for females over 15 years of age, and 14 cents for males and 11 cents for females under 15 years. Since 1917 wages have been increased 40 to 50 per cent. While in most cases Japanese labor is not as efficient as our labor, glass making seems particularly well adapted to their temperament and customs.

British glass factories are entirely occupied in making glass for the home trade and are said to have orders booked for their entire capacity for a year. Special attention is being given to certain articles such as incandescent electric light bulbs, formerly imported from Germany and Austria. Despite their great activity they are unable to supply all the domestic needs and there is a good market for imported glass. It is expected that Belgium will supply a small amount, but the United States should obtain the greater part of this business. Unfortunately import restrictions are such that only a limited quantity will be accepted.

Before the war practically no American glass was sold in Australia. When European imports were cut off, the importation of American glass and some Japanese glass was started. This market developed very rapidly and the indications are that the trade will be retained. It will be several years before Europe will be able to export glass, and it seems probable that the American product will become firmly entrenched. A great increase in the Australian trade is predicted for the near future.

Commercial Sizes of Crushed Stone

A Survey of the Present Practice in the States of Ohio, Kentucky, Tennessee, North Carolina and Georgia

By F. H. Jackson and C. W. Mitman
U. S. Bureau of Public Roads

THE SURVEY OF CRUSHING-PLANT practice inaugurated by the Bureau of Public Roads early in 1917, for the purpose of securing data to be used in the development of a system of standard sizes and uniform nomenclature of crushed stone products, was continued during the summer of 1918 in the states of Ohio, Kentucky, Tennessee, North Carolina and Georgia.

The information secured in the New England and Middle Atlantic States during the 1917 survey was published in the June, 1918, number of "Public Roads" (ROCK PRODUCTS, Aug. 14 and Aug. 28, 1918), together with a set of proposed tentative standard sizes based upon an analysis of the data obtained. In the present report the information obtained has been arranged in the same manner as in the article referred to. The deductions made will therefore be comparable.

Plants Visited

Of the 65 stone crushing plants inspected in the last field season, 34 are located in the western half of the State of Ohio and extend from the edge of Lake Erie southward to the Ohio River. Although stone-crushing plants can be found in almost every county in the western half of Ohio, there are certain centers in which activities are more or less concentrated. These are in the counties of Erie, Sandusky, Lucas, Hancock, Putnam, Allen, Franklin, Clark, Montgomery, and Hamilton. At least two plants were visited in each one of these centers, while in Lucas, Hardin, Montgomery, and Allen counties three plants were visited. The rock quarried throughout the State is a dolomitic limestone, occurring in perfectly horizontal beds varying in thickness from 3 in. to 5 and 6 ft., and lying within 6 in. to 2 ft. of the surface.

Six plants were visited in Kentucky, four of which are located in the vicinity of Louisville and two in the western part of the State. All of the plants crush limestone of the same character as that found in Ohio.

Five plants were visited in Tennessee. Four of these are located within a radius of 20 miles of Nashville and one located near Chattanooga. The rock crushed is a limestone of good quality when it can be obtained free from bands of shale or "rotten rock" as it is called locally.

Six plants were visited in Georgia, all located within a 50-mile zone of Atlanta. Three of these crushed granite as a by-product to the stone-block industry. Two crushed a bastard limestone and one a granite gneiss rock. All the plants visited have a small output and (with the exception of one of the plants crushing limestone), make crushed stone almost an incidental industry.

Seven crushing plants were visited in North Carolina, distributed north and south of an imaginary line extending from Asheville to Raleigh. All the plants crush granite rock, two making the crushing industry incidental to the stone block and monumental stone industry.

Procedure

As pointed out in the previous report, the most important element in the equipment of a crushing plant, in so far as quality of grading is concerned, is the screen. Screening methods therefore were given first consideration in the study of each plant. The data collected included the length over all, diameter, pitch, and speed of revolution of each screen, the number of screens in operation, and the length and diameter of each section of screen. If gravity or pulsating screens were used, their dimension, pitch, and size of holes in each compartment were obtained; the nominal diameter (or dimensions, if square holes) of each section of the screen at the time of inspection was recorded, together with the total length of each section having the same size holes. In addition, information was obtained pertaining to crushing and elevating machinery such as would present a complete flow sheet of operations.

The general condition and operation of the plant as a whole was noted and recorded. A record was made of each commercial size of crushed stone produced, including the name under which each size is sold, and the limits in size within which each grade is supposed to lie.

Finally, a sample of each commercial grade, available at the time of inspection, was obtained, and a mechanical analysis of each sample was made on the spot. Samples of grades smaller than one-fourth inch were mailed to Washington for mechanical analysis. The size of sample used in making each analysis was based upon the maximum size stone present as recommended by the First Conference of State Testing Engineers and Chemists and given in United States Department of Agriculture Bulletin No. 555.

Screening Methods in Use

All the plants visited are equipped with revolving screens, but a few in Ohio have in addition pulsating screens installed in various stages of the operation. Revolving screens, in the majority of cases, are used to obtain the larger sized products, while the smaller grades are obtained with the pulsating screens. The cost of maintenance of pulsating screens is high and as far as could be determined the only reason for installing them was that, for a limited space, a larger screening area could be obtained as compared with the revolving screen.

An analysis of results leads, in general, to the same conclusions as we noted last year. Thus, variations in pitch and speed of revolving screens, contrary to the general idea, appear to affect the grading very little. Likewise, it may be noted that, except in a very general way, the dimensions of the screens themselves have little influence on the sizes of the products. This, of course, does not mean that, in any individual case, the diameter, pitch, or speed of the screen does not influence the grading of the material produced. It does seem to indicate, however, that there are other influences at work which overshadow the effect of these variables.

As has been previously pointed out, the rate of feeding the stone into the screen, which, of course, varies continually during the screening operation and therefore can not be recorded, probably influences the grading to a marked degree.

Ohio Requirements Standard

In Ohio, practically all the operators are producing stone nominally in accordance with the state requirements for size. These requirements have been standard for some years, and, inasmuch as limestone is quarried throughout the state under practically the same conditions, it would seem that to produce these sizes revolving screens of the same diameter of perforations should be used in the various plants. As a matter of fact, this is far from true. For instance, of the 12 plants in the

state producing the Ohio No. 1 standard size limestone (2½-3½ in. or 2½-4 in.), or its equivalent, by means of revolving screens, one plant has 2-in. holes in its screen retaining the product, two plants have 2¼-in. holes, six have 2½-in. holes, two have 2¾-in. holes and one has 3-in. holes. Likewise, in the case of the No. 2 Ohio standard size (2½-1½-in.), in the 11 plants producing this material the same relative variations in size of perforation may be noted.

How these variations in plant installation affect the actual sizes of the product may be gathered from the tabulated mechanical analyses and will be discussed later. Suffice to say that even in a state where standard sizes for broken stone used in road construction have been in use for a number of years, revolving screens with 13 different sizes of holes are used to produce three grades of stone.

Screening Efficiency Greater

The average efficiency of screening operations is somewhat greater among the plants visited this year than among those in New England and the Middle Atlantic States. As recorded in the original report, 34 per cent of all the plants visited in 1917 produced the ordinary commercial sizes with less than 5 per cent variations from the nominal size perforations in their retaining screens. About 37 per cent of the plants visited in 1918 produced stone within this limit of variation. Again, whereas approximately one-half of all the plants inspected in 1917 showed less than 10 per cent variation from the nominal sizes, 62 per cent of the operations studied in 1918 were equally as efficient. This latter average is raised considerably by reason of the very efficient grading observed in the States of North Carolina and Georgia. The average results for the State of Ohio are practically the same as were obtained during 1917.

In a few instances samples contained a certain amount of stone larger than the perforations of the plant screen through which the stone was supposed to pass. The reasons for these discrepancies are the same as brought out in the previous report, namely, faulty chute construction, overflowing bins, etc.

Specifications Purely Theoretical

As explained in last year's report, the reason for analyzing the data obtained in this manner is to secure figures based on actual screening operations, which might be used in framing practical specifications for stone sizes. The average specification covering the size of crushed stone products is purely theoretical. It usually requires stone graded between certain fixed limits without any allowance for imperfect screening. It is the custom, therefore, of most operators to use screens with openings slightly larger than those specified, so as to obtain approximately the sizes desired. This custom results in the production of more or less indefinitely graded products, which sometimes do, but much more frequently do not, meet the letter of the specification.

It was in order that operators might be able to use screens with perforations the sizes specified and still secure, with reasonable care, products which conform to definite specification requirements that the system of tolerances given in the previous reports was suggested. This system calls, in general, for products graded between certain fixed limits as determined by laboratory screens, but allows as much as 5 per cent to be retained on the larger screen, and as much as 15 per cent to pass the smaller screen. It also provides, in general, that not less than 25 per cent nor more than 75 per cent shall be retained on a screen with perforations of as nearly as possible an exact intermediate size.

Tolerances Should Not Be Reduced

It was felt that for most types of construction in which broken stone is used, products meeting this specification would be satisfactory. They would, moreover, be literally meeting the specification and at the same time would possess the advantage of being practical from the standpoint of the operator. This system of specifying has been used in New York State for a number of years. The only other scheme which has been proposed to care for the situation is the one in use by the State of Pennsylvania. In the specifications of this state, revolving plant screens are used as the basis for determining the sizes required. The results of using this method, insofar as the actual grading of the products obtained is concerned, has been previously discussed.

The information obtained during the 1918 survey would indicate that, from the standpoint of present efficiency in production, the tolerances suggested last year may not be reduced without eliminating the products of a considerable proportion of the plants involved. Before considering a more rigid specification, it is therefore necessary to presuppose increased efficiency in operation. Whether the increased cost involved in increasing efficiency would be justified is a question. In the opinion of the writers it could only be justified in cases where exceptionally well-graded stone is required.

Uniformity in Nomenclature

With the exception of the State of Ohio, there is practically no uniformity in the nomenclature used in designating crushed-stone products. The State of Ohio has, for some years, used a standard system of stone sizes, each size being designated by a number. The majority of the crushing plants in Ohio which were visited use the state system of numbers in designating their product. This is about as far, however, as the uniformity extends, because even the operators who use the same nomenclature do not always use the same screens for obtaining nominally the same product, nor do the products themselves have always the same grading.

The general tendency is to produce larger stone than that specified. Just 3 out of the 35 products indicated meet the state requirements for size as called for by the number under which each is sold. In the writers' opinion, this fact furnishes about as convincing an argument against the practice of specifying definite limits for stone sizes as could be desired.

One point in connection with the standardization of stone sizes which has not been discussed is the effect of character of stone on the maximum size allowable in various types of construction. It is recognized, for instance, that the sizes should be somewhat larger in the case of limestone than where granite or trap is used. It may be necessary, therefore, to modify the proposed system of sizes to cover this point.

General Conclusions and Suggestions

As a result of the field investigations carried on during the past summer it is possible to indorse the eight conclusions summarized in the previous report. It is felt that the necessity for standardizing stone sizes has been demonstrated. It is recognized by both producer and consumer alike, and in the writer's opinion it should be possible very soon to reach some basis of understanding along the lines indicated which will result in the general adoption of a series of standard sizes to be used throughout the country. Numerous operators in the course of these investigations have stated that if a standard system of sizes were adopted they would be able to turn out a better grade of product than is now possible.

The ideal crushing and screening plant operation is one in which the crusher is always crushing stone, the elevator is always elevating stone, and the screen is always receiving and screening a fixed quantity of stone. It is of course practically impossible to keep the crusher operating continuously, so that there are always intermittent periods when the screen is running practically empty. At other periods it is heavily loaded, and between the two extremes the amount of stone in the screen is constantly fluctuating. This is undoubtedly one of the principal reasons for variations in the grading of the screened products. To remedy this condition, it might be found advantageous to install a hopper at the charging end of the screen from which stone could be fed at a definite rate.

Push Type of Conveyor for Handling Bulk Cement

Details of Device Used at Plant of the Adelaide Cement Co., South Australia—Much Used in British Colonies for Handling All Rock Products

SIR: In the June issue of ROCK PRODUCTS appears a notice of a type of conveyor new to cement works, now in use at the works of the Adelaide Cement Co., at Birkenhead, South Australia. In the somewhat offhand matter-of-fact description which I gave the editor, and the few pencil-scribbled sketches made to illustrate the action of this conveyor, it is not surprising that some things are not quite right. For instance, the stroke or travel of push blades is given as 6 inches, instead of 21 inches, and the diagram and descriptive note in the issue referred to, although of possible interest to cement people in this country as a new stunt, would not, I fear, be of much value to them unless amplified by fuller details and essentials of construction and operation.

Although reluctant, as a mere visitor to this wonderful country, for my name to appear on the pages of its technical journals, I owe so much to so many people for the great courtesy extended to me, and for the information so freely given by the cement people at the many plants I have visited, that I am quite anxious to reciprocate in any way possible.

The Push Conveyor

The Push Conveyor as it is called in Australia, was developed 18 years ago, on the great gold fields of Kalgoorlie, W. A. Its first utility was found in conveying red-hot ore from roasting furnaces, the dust and heat from which wore out and buckled screw conveyors almost as fast as they were put in. It was then adopted for all purposes of conveying ground ore, and the reduced wear and tear, there being no bearings to renew, the great saving in power, freedom from dusting, and simplicity of application, soon ousted the miles of screw conveyors with which the dry crushing mills of Kalgoorlie had been originally equipped. Today it is the standard conveyor for ground ore on the mining fields throughout Australia and in South Africa, and other parts of the world where similar dry crushing mills are installed.

The writer, when designing a new cement plant in South Australia adopted the form and dimensions substantially as shown on the accompanying illustrations. At first some doubt was raised about the mixing of materials, that important point, particularly in the raw end of a dry-process cement mill, and to prove this out, some plaster of paris was put into a small cleaned-out section of screw conveyor carrying cement.

As can readily be supposed, the screw flights took cement and plaster in their order to the end of the conveyor; of course the plaster and cement respectively in each flight or pitch of screw was turned over and over in itself, but that was all—there can be no mixing of one section with another, except some commingling at the hangers.

With the push conveyor, on the other hand, the action of the blades, in riding back over the heaps left at the end of each stroke, scrape off a small portion from the top of one heap and mingle it with the one behind, on the next stroke these already partially mixed heaps are again mingled one with the other, and so on at every stroke, so that in a length of conveyor of say 80 to 100 blades or more a very thorough mixing of the whole content of the conveyor trough is obtained.

With the large tube mills so generally used now, however, the mixing given in the mill itself is so thorough that one may ask if any further mixing in a conveyor will do any good at all.

Details Described

Referring now to the illustrations, it will be seen that there are certain limitations of application of this conveyor. It works quite smoothly on all grades of crushed rock below about ⅜-in. mesh, but there is occasional trouble from flats and wedge-shaped pieces jamming under the blades. When dealing with ½-in. mesh and above that size it does not do at all. Then on very short lengths, or in certain confined positions there is nothing better than the screw conveyor.

The push conveyor is very simple and easily explained. The blades are made of thin steel plate, say 12 gauge, riveted to a pair of hangers of 1½ by 5/16 in. steel, bent to swing easily around a ¾-in. pipe distance piece, having a ⅝-in. bolt through it. The bent ends of the hangers form a balance to the out-of-center weight of the blades, which thus swing easily and ride up over the material on the backward stroke, but are prevented by the pegs from doing so on the forward stroke.

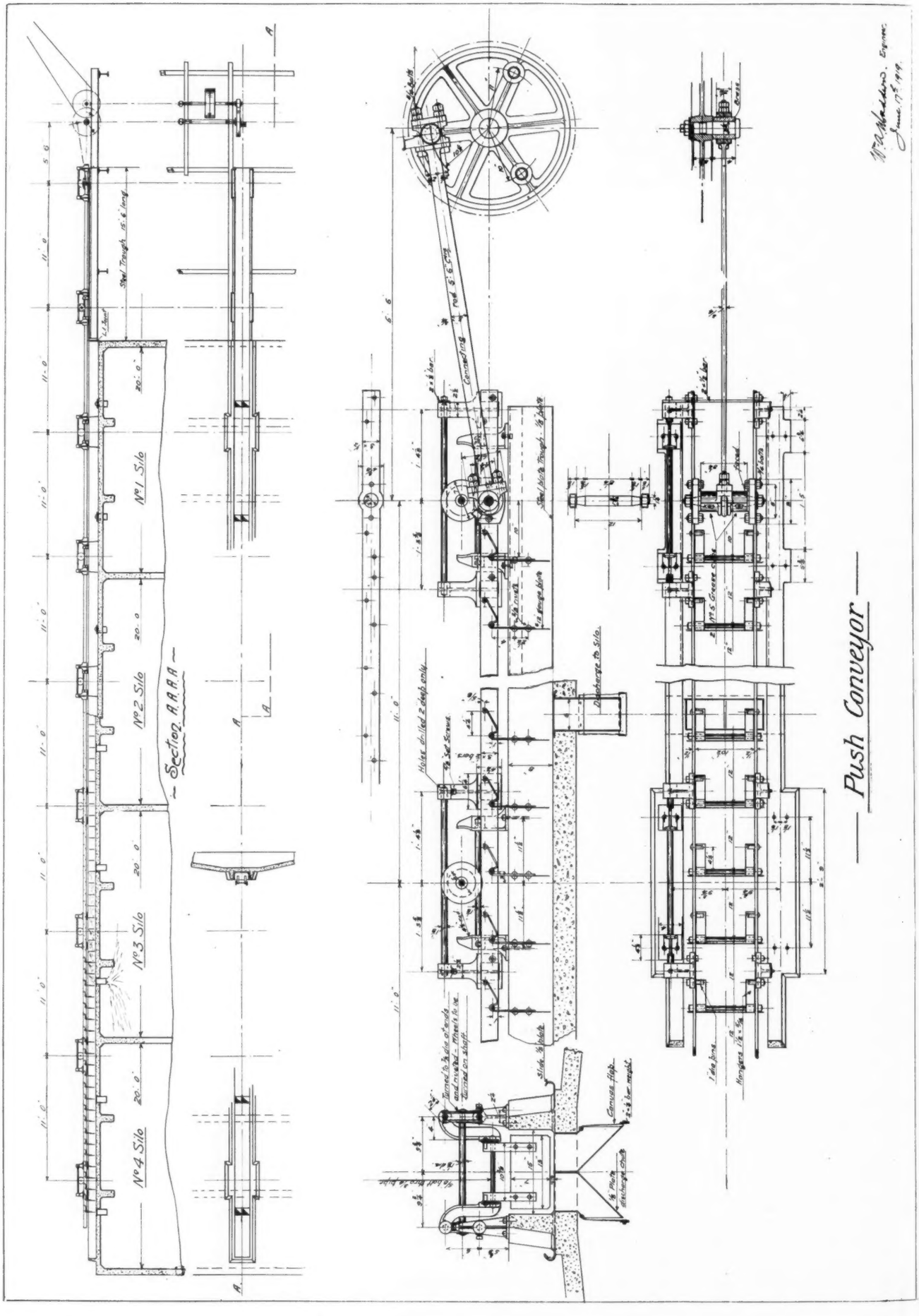
The blades are attached at 12-in. centers to a pair of 3x½-in. steel bars, which are reciprocated by a connecting rod, crank pin and gearing placed at one end, preferably the discharge end, so as to pull and avoid the vibration of rods, as when pushing a long length. On a large conveyor, 200 ft. long, which the writer designed 17 years ago, the gearing was placed in the center of the length, above the rods; and incidentally it may be said that all the troubles of the screw conveyors which this replaced thus came to an end. No more music from grinding parts, no more worn-out sleeves, or slipping or broken belts. The new conveyor worked so silently at less than half the power consumed by the screws that we just forgot about it. Using a blade 7-in. high, the best distance apart is about 12 in., and this requires a stroke of about 21 in. The writer usually provides two or more bored out bosses on the crank disc, so that the length of stroke may be varied an inch or so, according to the load carried. The action then is to pass the material from blade to blade on every push stroke.

The feed can be given at any one or more points, and the discharges put anywhere desired by simply placing slides under slots across the bottom of conveyor and opening these the amount required for the quantity to be drawn off.

An important point is to limit the speed or stroke per minute to something under 24. At 20 to 23 strokes the blades swing smoothly and lightly over the material, slightly compressing it, like a trowel, and no dust whatever is caused. With too high speeds there is some chattering and a certain flip to the blades which raises a small amount of dust.

It is not necessary to place any cover over the conveyor trough at the speed given above, and dusting from feed or discharge chutes can be prevented by flaps of canvas or light steel plate doors hung over the exits which open sufficiently to allow material to pass out, but shut out the dust.

The supports to the 3x½-in. rods will be readily understood from the illustration. They are placed at from 10 to



Details of the conveyor referred to in the description of the Adelaide Cement Co. plant, South Australia, in "Rock Products," June 7, 1919, p. 33.

12 in. apart, and are in the form of anti-friction grooved rollers, the weight of the moving parts is carried by suitable bracket castings to a 1⅛-in. dia. rod, which runs on top of the grooved rollers, and the latter rolls along in the same direction, but for only half the distance, on a similar 1⅛-in. dia. rod, supported in castings bolted to the steel or concrete trough, as the case may be. Thus the bottom rod need only be made a little more than half the length of the top one.

The natural shape of trough for this type of conveyor is rectangular in cross-section, and it may be of steel or concrete, the latter making a very nice job when formed in one with cover slabs of bins, or silos, or on floats. The illustration shows both constructions, the length of steel troughing being attached to a concrete trough on top of raw meal silos for filling the latter from an elevator some distance away.

When replacing screw conveyors, it has generally been the practice to make use of the original trough, in which case the blades are made semi-circular on bottom to suit. The blades should have at least ¾-in. clearance in the troughs on all sides. It is very important to allow large bearing surfaces in the connecting rod ends, and to make a good and proper connection between the 3x½-in. rods and the gudgeon pin castings. Note the 2½-in. dia. bored hole, and the rod enlarged around it to 4⅜-in., so as to fit snug in a concentric groove turned in the gudgeon castings.

The conveyor is very simple to make and can be turned out quite satisfactorily in any ordinary repair shop. The hangers should be bent hot around pegs set in a gauge plate so as to be all alike and interchangeable, and all holes for bolts and rivets should be bored to template.

The conveyor, as shown, will handle about 360 tons per 24 hours. The capacity can be figured very closely as follows: The heaps when 7-in. deep at the blade will be about 2-in. deep at the thin end, thus its contents will be 12x4½x13-in., or 702 cu. in. Then

$$\frac{702 \times 20 \text{ strokes} \times 60}{1728} = 487 \text{ cu. ft. per hour}$$

Cement partially compressed weighs say 85 lbs. per cu. ft. Hence 487 times 85 divided by 2000 equals 20 tons per hour, the limit at which point some blades may refuse to pick up. The 360 tons per 24 hours, as stated above is fairly easy work, and the writer has known this size conveyor to handle that tonnage regularly for years. The width of blades can be increased up to 20 in., all other sizes remaining as shown, which of course will give a directly proportional increase in capacity and for still larger capacity, wider and deeper blades, with stiffer parts, can be made up ad lib.

Wm. A. Maddern.

Greencastle, Ind., June 16, 1919.

Editor's Note—Inquiry shows that this type of conveyor, known here as the reciprocating type of conveyor, has been used to some extent in foundries for conveying and mixing foundry sands. So far as is known by the manufacturer of this type of conveyor in this country, the Link-Belt Co., Chicago, they have never been used in cement mills.

Details of the conveyor referred to in the description of the Adelaide Cement Co. plant, South Australia, in "Rock Products," June 7, 1919, p. 33.

Kansas Authorities Would Destroy Profit in a Barrel of Cement

Cement Manufacturers Accused of Making a Living Since the Down and Out Stage of 1915

KANSAS CITY, Mo.—Under the direction of Richard J. Hopkins, the attorney general, the inquisition into the alleged cement combine in the State of Kansas rolls on. He declares that a combine does exist and that prosecutions will soon begin. For several months he has been investigating the cement companies manufacturing within Kansas and their relationship with traffic bureaus. Among the companies recently investigated were the Bonner Portland Cement Co., at Bonner Springs, Kans., the Monarch Cement Co., and the Iola Portland Cement Co., of Iola., and the Western States Portland Cement Co., of Independence, and a Humboldt concern.

Says Cost is $1.42 a Barrel

The attorney general and his 10 deputy auditors have examined the books of nearly every concern in the State and have found, they say, that the cost of manufacturing cement is practically the same at all the plants, namely, about $1.42 per bbl. The average price of cement throughout Kansas is about $2.10 per bbl. It is alleged that there has been no competitive bidding among the companies since a meeting of cement men in 1915, when it is stated by the officials, plants that were practically bankrupt were immediately refinanced and began operation, and plants that were in the hands of receivers were bought in at low prices and financed by calling in common stock and distributing it to preferred stockholders and beginning operations on an increased production program.

The Bonner Portland Cement Co. came in for an early investigation through the efforts of officials of Wyandotte County, Kansas. It was stated that all bids for furnishing the county with cement for the building of roads were the same and that the Bonner Portland Cement Co. was awarded a contract with the county, partially because of the nearness of its plant. The company charged the county, it was stated, the same price for cement as it charged other customers hundreds of miles away, where it incurred the additional freight charges. The county officials asserted that the company should sell cement in that county, where practically no freight rates were incurred, cheaper than the cement shipped for a distance. The attorney general, after investigation, declared that he had obtained a reduction of 10 cents per bbl. from the Bonner company.

The heads of each company are now being summoned to Topeka, Kans., where depositions and testimony will be taken to determine the relationship of the companies with the Portland Cement Association, the Norcross Audit and Statistical Co., and the Manufacturer's Traffic Bureau of Kansas City.

Governor Sees Other Combines

Governor Henry Allen, of Kansas, recently said that information he had received left no room for doubt concerning an alleged combination between the brick and cement men. He declared that, for years there had been no competitive bidding between either brick manufacturers or cement manufacturers and that the plants, of which there are many throughout the state, are all members of a strong association. Governor Allen stated that the full power of the Montee-Barrier bill would be used to break up the combine, providing it could be proved that a combine did exist.

Demand for Lime and Cement in Philadelphia

PHILADELPHIA, Penn.—Up to a short time ago the demand for cement and lime was very small. Recently there has been a considerable increase, due to the expansion in building operations. Purchasers are realizing that prices of these materials have advanced very conservatively, as compared with other commodities. There seems to be no hope for immediate reductions in prices, and the building trade seems to have accepted the situation on this basis and to have gone ahead.

The Largest Lime Plant in the World

Muscle Shoals Air Nitrate Plant Has Seven 8x125-Ft. Rotary Kilns—Pulverized Coal Firing System Described in Detail—Operating Experience

THE description of the lime plant at Muscle Shoals, Ala., begun in the July 5 issue of Rock Products, is concluded in the following pages. The previous article described the origin of the enterprise and dealt with the quarrying and transportation of the limestone.

As stated in that article, the limestone is brought by rail in standard-gage equipment to track hoppers and then elevated to reinforced-concrete bins feeding the kilns. From the seven compartments of this bin, each compartment holding 250 tons, the kilns are fed as follows (For much of the data following Rock Products is indebted to M. D. Jones, of the Fuller Engineering Co., Allentown, Penn.):

Kiln Feeds

A by-pass for dust and fine material is provided in the spouts feeding the kilns. The dust thus removed is taken away by a screw conveyor in the floor in front of the kilns to an enclosed elevator and conveyor which discharges it at the farther end of the building, near the finished lime outlet. Another belt conveyor discharges the dust into a railway car, as shown in the accompanying view.

The crushed stone is fed from the bins to the kilns through 10-in. asbestos-protected cast-iron spouts. Control of the amount of stone fed to the kilns is by means of 12x12-in. cradle segmental feeders, which are operated by a rope-drive from the kiln driving shaft.

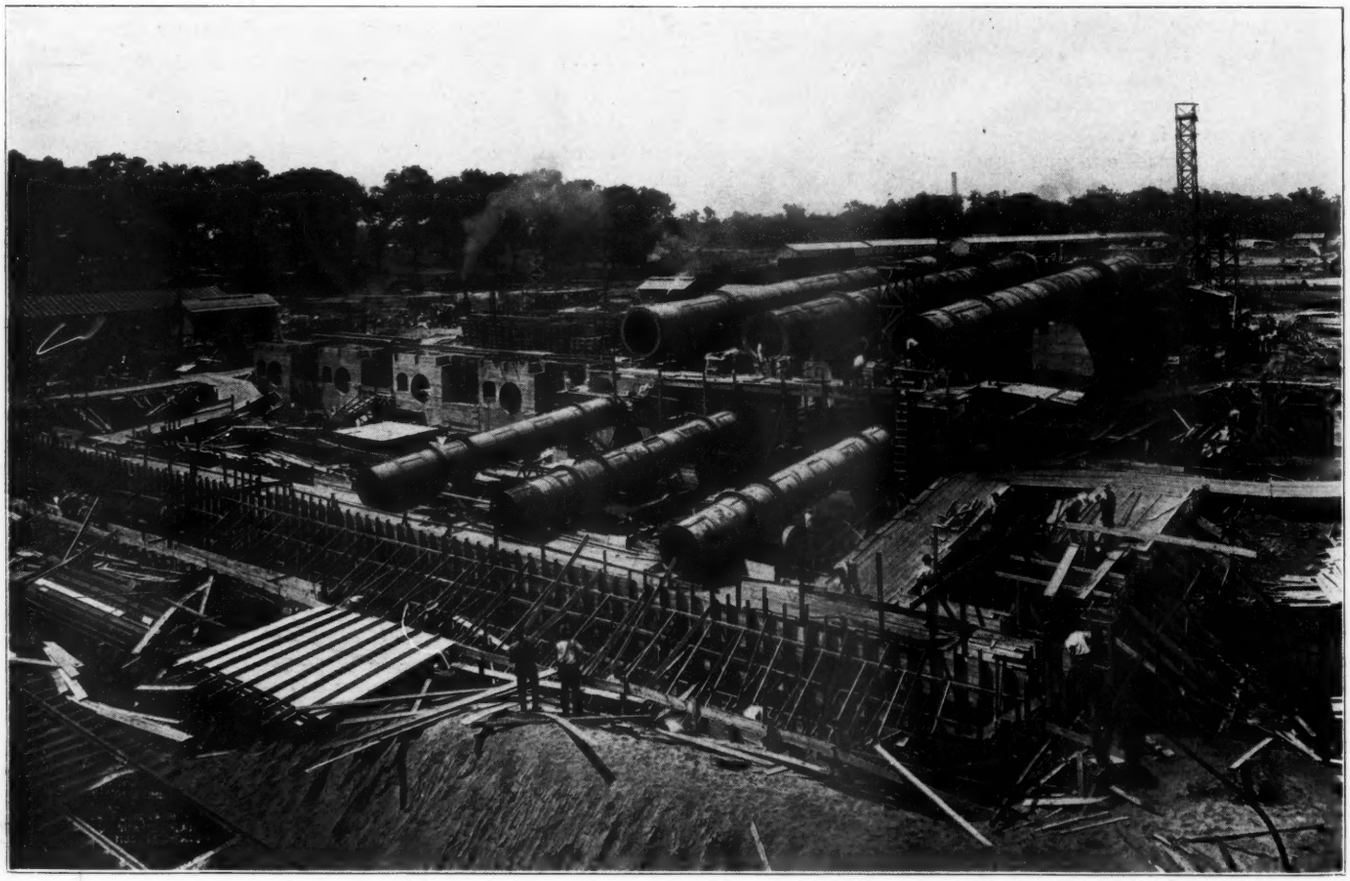
The feed passing through these cradles depends, of course, upon the angle of repose of the crushed stone and the number of dumps or oscillations to the cradle per minute. The weight of the stone dumped each time can be varied over a wide range by an easy adjustment of the eccentric which moves the cradle feeder back and forth. The number of dumps or oscillations per minute of course depends on the number of revolutions of the kiln per minute, the driving shaft of each being the same.

The kilns are 125 ft. long by 8 ft. in diameter. There are seven kilns in parallel, as shown on the accompanying plan and views. The slope of the kilns is ½ in. to the foot. The kiln lining is 9 in. thick for the first 46 ft. and 6 in. thick for the remaining 79 ft., from the fired end of the kiln.

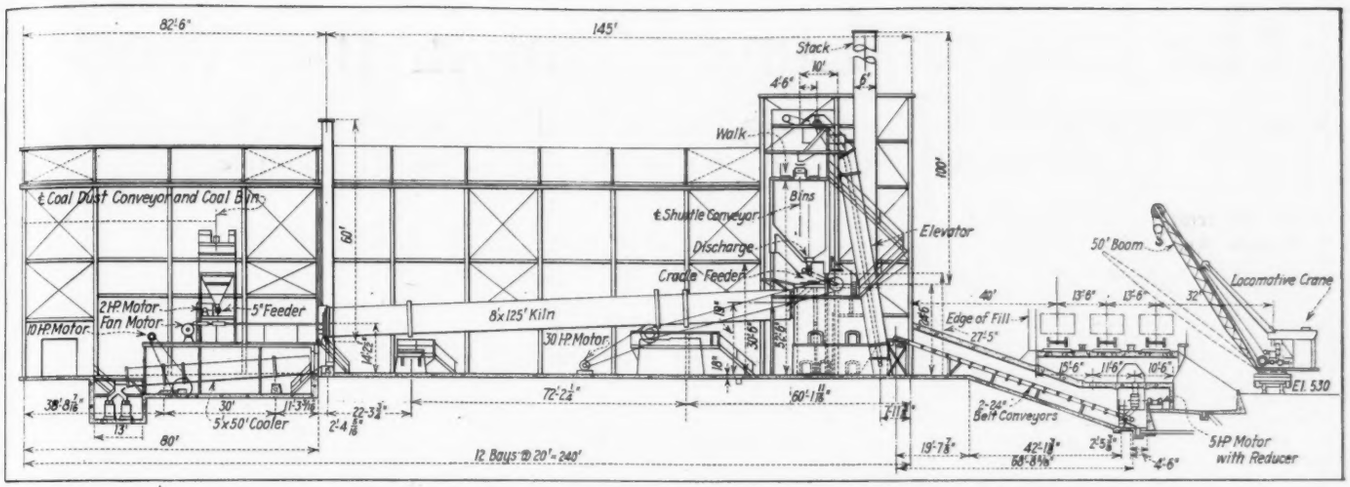
Each kiln is belt driven from a 30-h. p. variable speed electric motor. In the views shown the motors are housed as protection against the weather, as at that time the building had not been entirely enclosed. The kilns were operated at a speed of one revolution between 1½ and 2 minutes.

The kiln stack chambers are of the usual type with baffle walls. The steel stacks are 6 ft. in diameter and 100 ft. high above the stack chambers. The removal of stack dust is provided for by hoppered bottoms in the stacks and doors as shown in the accompanying illustration.

The hot lime discharged from the kiln



Lime plant at Muscle Shoals under construction, showing 125-ft. kilns and 50-ft. rotary coolers. The coal pulverizer house is not shown, but is located just to the right of the lower right-hand corner of the view



Section through the kiln room showing process of material from stock pile to finished lime conveyors

passes through the cooler stack chamber and enters a cast-iron chute feeding a rotary cooler 5 ft. in diameter and 50 ft. long. The coolers are set on a slope to the horizontal of $\frac{5}{8}$ in. to the foot. The coolers are provided with stacks 3 ft. in diameter and 60 ft. high, placed at the feed end of the cooler. The hot lime is discharged into a spout so arranged that the lime may be taken away by either of the two parallel pan conveyors that are provided to take the output of the seven kilns.

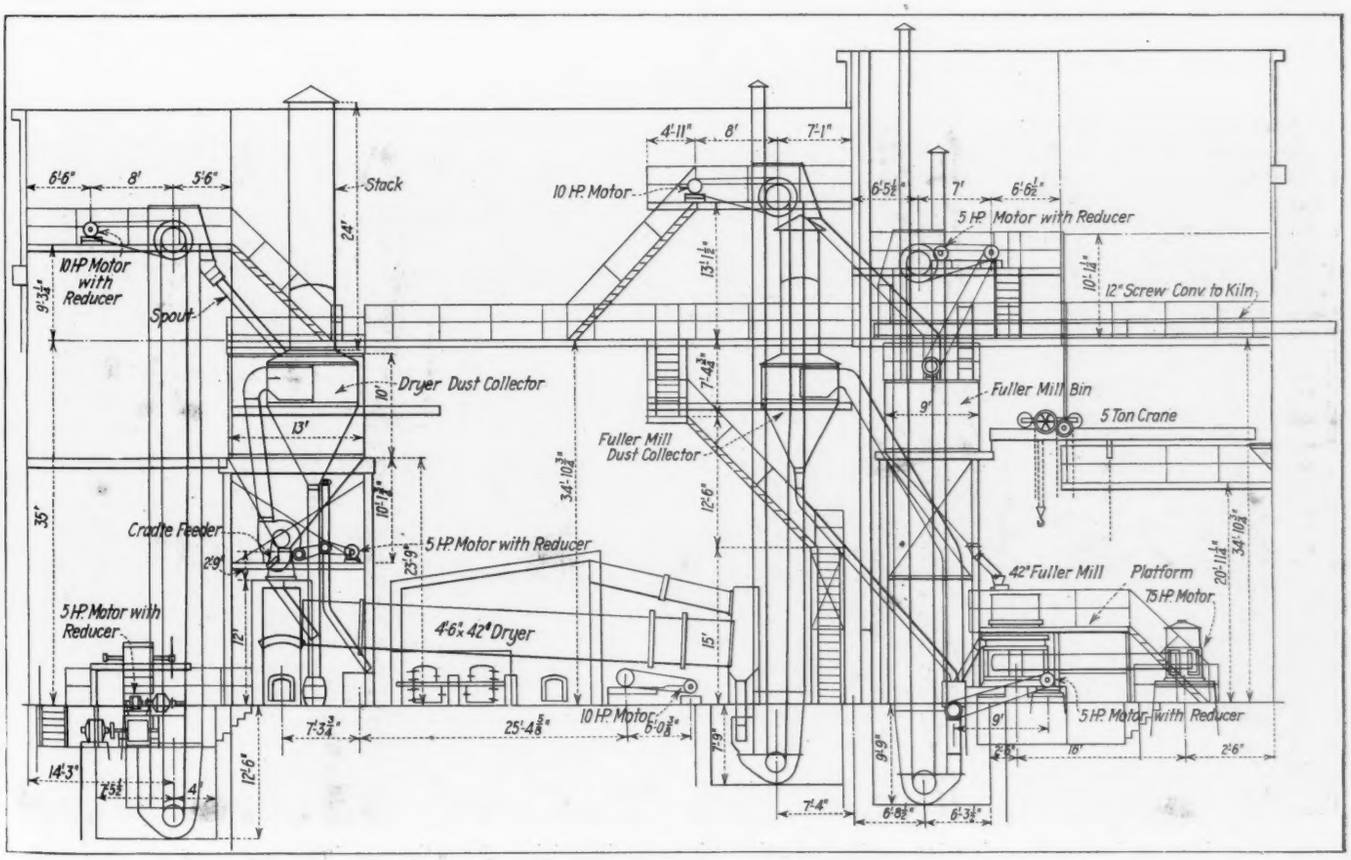
The pan conveyors take the hot lime to the pit of an enclosed bucket elevator, which discharges to a system of belt conveyors, which in turn carry the lime over a bridge into an adjoining building, where the lime is mixed with coke and is passed on to the electric furnaces where the calcium carbide is made.

The kiln building is 240 ft. long by 200 ft. in width. It has a structural steel frame and is enclosed with corrugated-iron sheeting. Under the same roof is the coke drying and pulverizing machinery. Thus both raw materials are fed from the same end of the building and from the same in-bound railway tracks.

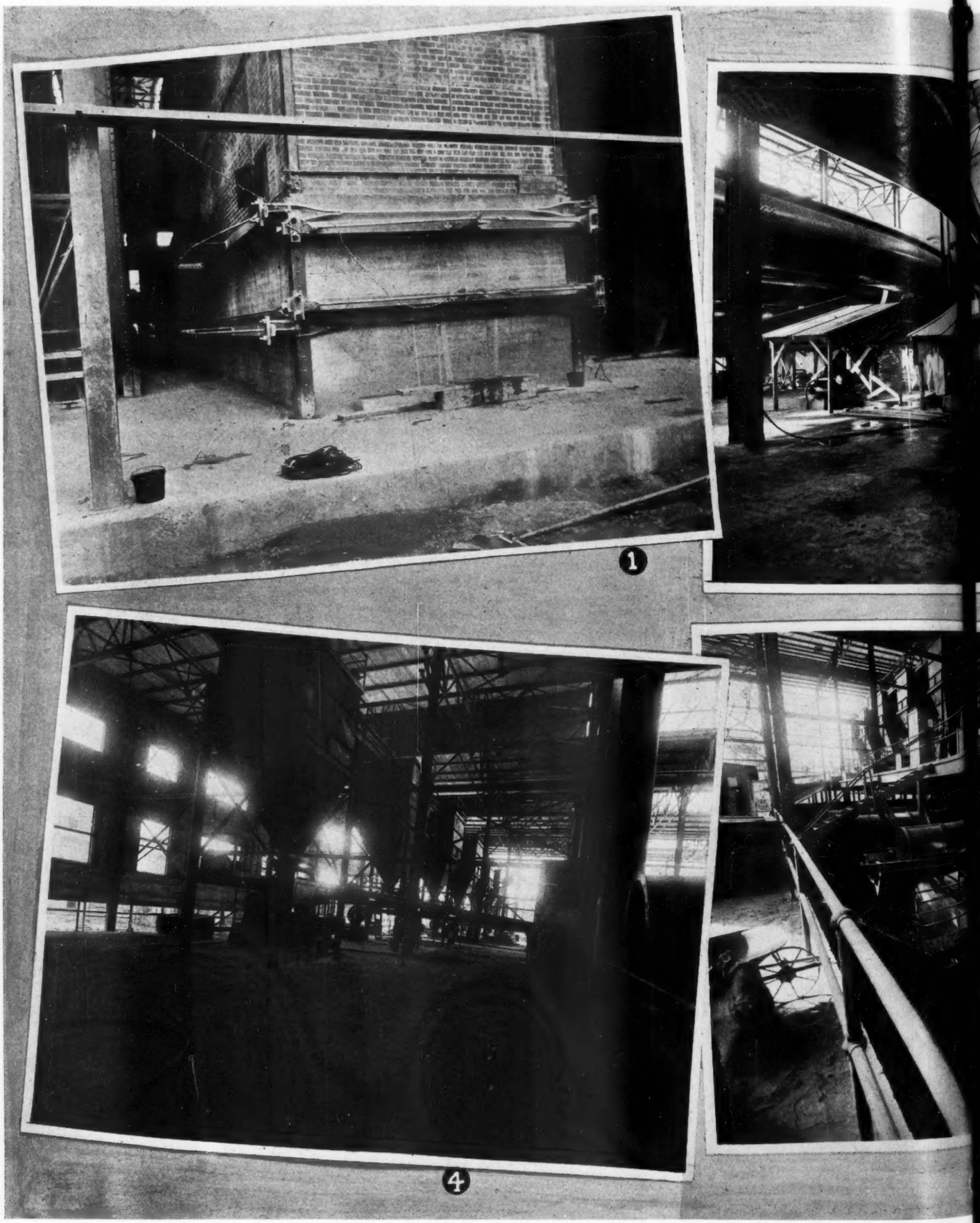
One of the most interesting features of the kiln plant is the machinery and arrangement for firing the kilns.

The fuel used is pulverized coal, which is prepared in a separate building and then conveyed to the kiln building and deposited in pulverized coal bins, one being provided for each kiln, as shown in the accompanying views.

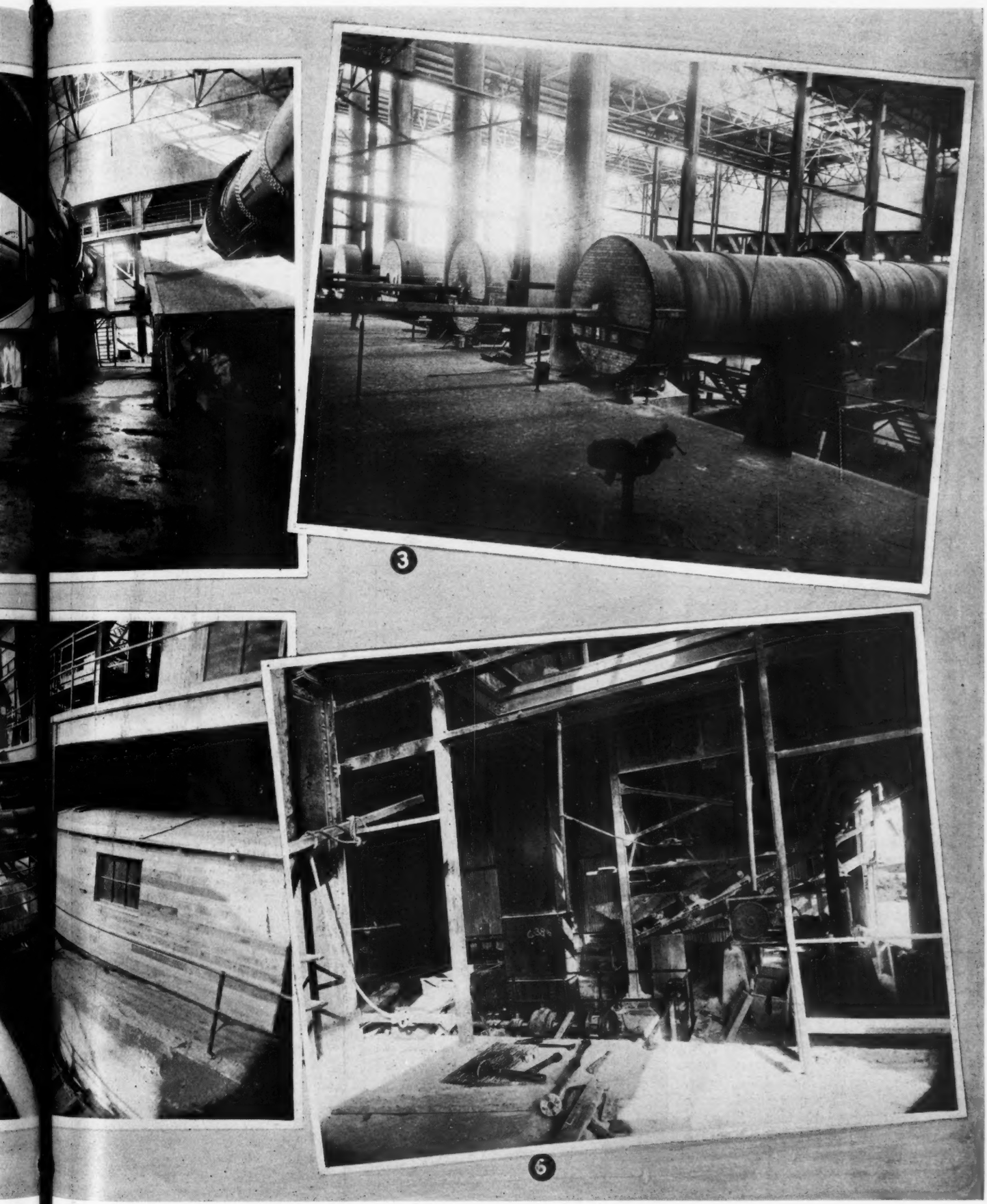
The coal to be pulverized is brought in bottom-dumping railway cars and dumped into a track hopper in front of coal-drying building. It passes from the hopper to a 30-in. belt conveyor, then through a 24x24-in. single roll coal crusher which reduces it to 1-in. size.



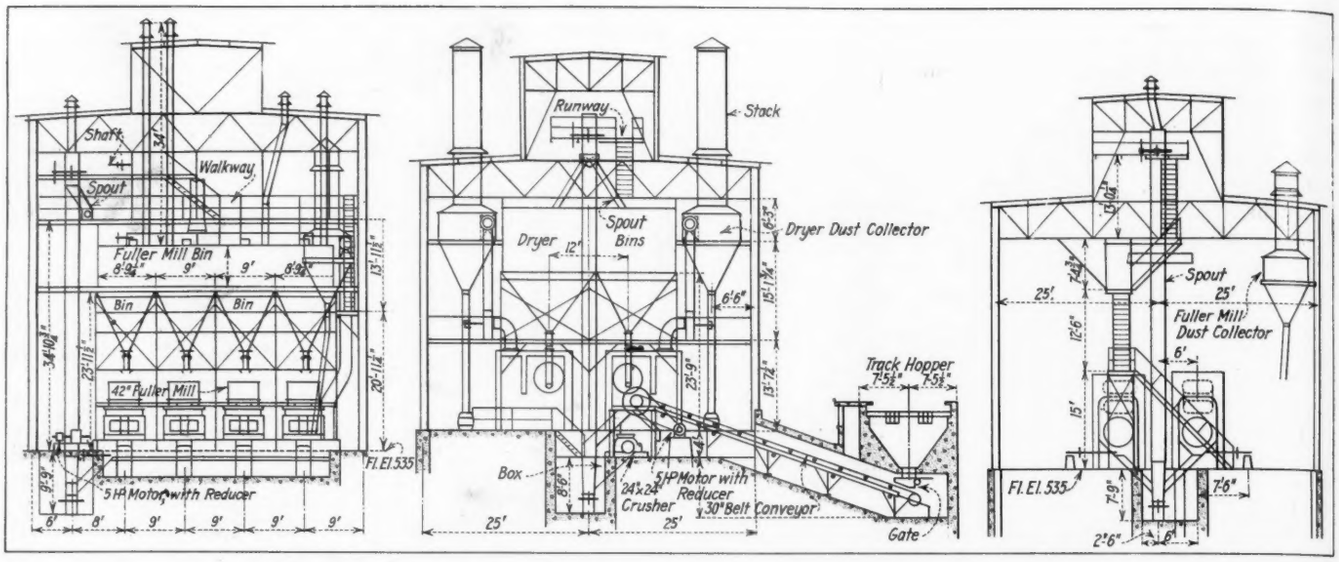
Longitudinal cross-section of coal-pulverizer house



(1) Lime-kiln stack chamber, showing method of reinforcing; (2) kiln drives from floor of kiln-room—motors temporarily housed; ors for finished lime; (6) elevator for finished lime and



of kilns taken during operation; (4) pulverized coal bins and blowers for firing kilns; (5) rotary coolers and pair of pan conveyloader for disposing of unburned fine limestone dust



Cross-sections of coal-pulverizing plant; (a) Mills and feeding bins; (b) Track hopper and conveyor for raw coal; (b) Discharge ends of dryers

This crusher is driven by a direct connected 25-h. p. electric motor. The head pulley of the belt conveyor is a magnetic separator, for the purpose of removing tramp iron from the coal before it reaches the crusher.

On leaving the crusher the coal is discharged into a bucket elevator which feeds the dryer storage bin. The wet coal from this bin is fed to a 4 ft. 6 in. by 42 ft. rotary dryer. The coal enters the feed end of the dryer through a cast-iron feed spout and the coal is fed to dryer by means of a cradle feeder.

The dryer is so arranged that the combustion takes place around the outside of the shell, the hot gases then passing through a flue and then through the interior of the shell without any flame coming in contact with the drying coal. A steel plate exhaust fan is connected to the dryer. The dust which is carried by the gases passing through the exhaust fan is collected by connecting the exhauster to a 104-in. diameter dust collector.

The coal discharged by the dryer is delivered to four bins over the pulverizers in the milling department. These bins and also the dry coal and pulverized coal elevators are fitted with 12-in. vent stacks to avoid the danger of explosions.

The dried coal is pulverized to a fineness that at least 95% will pass through a 100-mesh screen. Four 42-in. mills, each driven by a 75-h. p. vertical motor do the pulverizing. Each mill gives a capacity of over 5 tons per hour with a fineness running around 97% through a 100-mesh.

The pulverized coal from the mills is discharged into a screw conveyor built into the floor. The conveyor taking the discharge of the mills is connected to an

Pulverized coal bin and control apparatus for firing kilns

88-in. dust collector so arranged that the dust carried along with the air is discharged back to the conveyor. The pulverized coal conveyor delivers into a bucket elevator discharging into the screw conveyor which connects the coal mill and kiln buildings. This screw conveyor discharges into seven bins for pulverized coal in the kiln building.

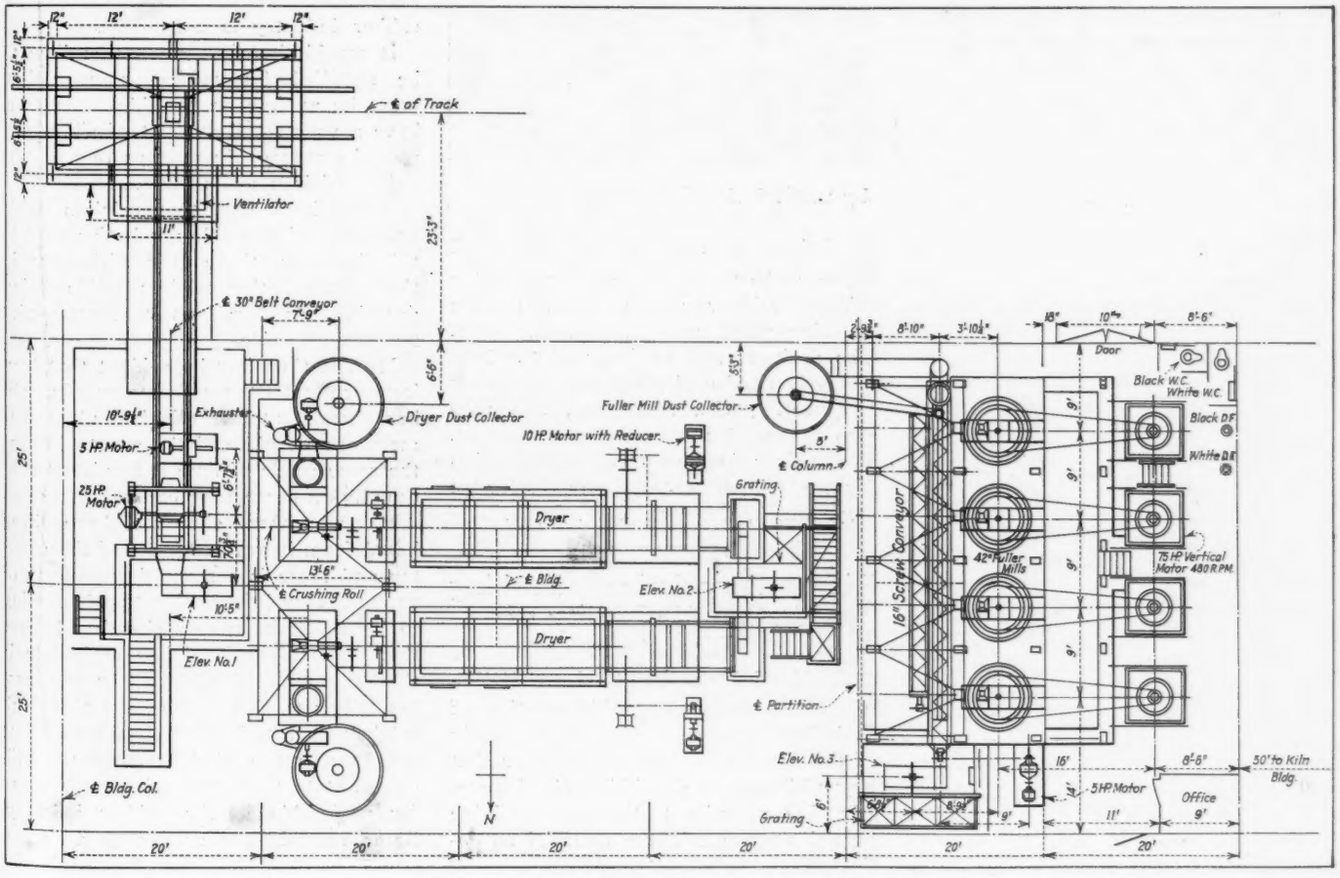
To each of these coal bins a pulverized coal feeder is connected. The feeder is driven by a 2 h. p. variable speed motor, thus making the quantity of coal used under the constant control of the operator. The coal passing through this feeder falls through a short vertical pipe into the path of the air being blown through a burner feed pipe. The air is furnished by a pressure blower connected directly to the coal burner feed pipe, which is capable of delivering about 2,200 cu. ft. per minute at a 5-oz. pressure when running at 1,800 r. p. m. The quantity of air from the blower passing through the feed pipe may be controlled by means of a slide provided for that purpose. The quantity of induced air is controlled by means of a cone on a sliding sleeve set a little back of the point where the coal enters the burner pipe.

Coal dryers—furnace end

Operating Experience

Unfortunately, for the most valuable results to American lime manufacturers, the plant was not operated long enough to thoroughly test it out. However, the following interesting data were furnished by G. E. Cox, of the American Cyanamid Co., Niagara Falls, Ont., who had charge of operation of the lime plant as long as it was operated.

The kilns were designed for a capacity of 100 tons of lime per day of 24 hours. While seven kilns were provided



Plan for coal-drying and pulverizing house

it was intended to operate only five of them at a time, the two others being held in reserve.

The usual difficulty in attempting to burn fine stone in a rotary kiln was experienced. Mr. Cox states: "In regard to the travel of fine crushed stone through the kilns, it is important that the difference between the large and small size be as little as possible so there will be no material separation of the fines and coarse through the kiln. If there is much very fine stone the large stone will revolve around the fine stone entraining the fines and consequently the fines will come out unburned. With reasonable care in crushing, however, this difficulty will be avoided and all the stone will come out well burned. The size stone used in these kilns was that passing through 2½-in. ring and over ½-in. ring. In regard to the fineness of stone that it is feasible to burn in a rotary kiln, fineness makes no difference, as in case all the stone is reduced to a reasonably uniform small size, the stone will be thoroughly burned. The important feature is to see that the range of the size of stone is reasonable, such as that described above, as in case of a wide range the coarse stone will rotate around the fines, allowing much fine material to come out unburned.

"The unburned stone in the product at Muscle Shoals was, under normal conditions, less than 1%. In rotary kilns, with proper crushing and sizing of the stone, it is easily possible to reduce the unburned stone to the very small fraction of 1%.

"The fuel used at Muscle Shoals was pulverized coal. Temperature control was obtained by control of the coal feed and air supply.

"The ratio of coal to lime burned was about 2.8 lbs. of lime to 1 lb. of coal. The quality of the coal, however, was inferior. With a good grade of coal it is easily possible to burn 3 lbs. of lime to 1 lb. of coal."

The Air Nitrates Corporation supervised the general designs and directed all the work of construction and operation.

The designer and engineer of the crushing plant, was Preston K. Yates. The designer and engineer of the lime and pulverized coal plant was the Fuller Engineering Co., Allentown, Pa., who also furnished much of the equipment. The officer in charge of construction for the United States Army, Ordnance Department, was Col. J. W. Joyes.

Battery of Fuller mills driven by vertical electric motors

Lime Association Pushing Tests on Solubility of Limestone

FROM INFORMATION DEVELOPED at the Knoxville meeting of agriculturalists, says a weekly bulletin of the Lime Association, it appears that ground limestone should be valued somewhat in proportion to the amount of fine particles present in the material as delivered to the farmers. At the present time, practically nothing is known as to the degree of solubility of the various sizes of limestone and it appears that the program which has been so frequently mentioned in this letter, relating to the investigation which it is proposed to carry on, relative to the solubility of limestone, will furnish information whereby we can determine the rate of solubility of the various sizes of material between the coarsest and finest limits. It is expected that we shall be able to assign what may be called a solubility factor which will apply to each size particle of a given stone.

Lime in the Rubber Industry

THE LIME ASSOCIATION'S inquiries into the use of lime in the rubber industry brought to light the following information:

Calcium oxide and magnesium exide are both highly esteemed by the rubber industry for use in compounding rubber stock. Lime for this purpose displaces other metallic oxides—as, for instance, zinc oxide. It is used as a drying agen tand a san accelerator in vulcanizing.

The oxides of iron and alumina are impurities that are undesirable but have no very active influence on the finished product.

Silica acts as a hardening agent when present in large quantities.

The carbonates of calcium and magnesium are inert materials so far as the rubber industry is concerned.

It would therefore seem that lime to be supplied for rubber compounding must be as free as possible from core, have a very small amount of silica, and must be reasonably pure as regards the oxides of iron and alumina.

While it is true that calcium oxide and magnesium oxide are both useful in this industry, there is a difference in their action, the calcium oxide being described as harsh as compared with magnesium oxide.

It must therefore be evident that having once met the requirements of a rubber chemist at an individual plant, our members should strictly see to it that the same grade of lime is furnished continually on succeeding orders.

Many rubber chemists have been heard from in various parts of the country and there is a surprising amount of contradictory information that is coming to light. Some rubber chemists believe that finely divided calcium carbonate is the only material which they can successfully use. Others believe that high calcium hydrate is the only form of lime that can serve their purposes. Still others state that magnesium oxides are far preferable in the rubber industry. Some regard lime simply as a drying agent, others as an accellerator in the vulcanizing of the rubber stocks.

Are You Making a Profit?

You May Think You Are—But You'd Better Keep a Wary Eye on Those Insidious Half-Cent Leaks Whose Effect Is Out of All Proportion to Their Apparent Importance

By F. C. Belser

ALTHOUGH accounting has in the past been generally considered as an unproductive expense and has therefore not been given the attention which it deserves, there has been in recent years a very general realization that without accurate knowledge of the cost of production and the expenses of doing business, the manager of a business concern is as helpless as the pilot of an ocean liner without a compass. The progress of cost accounting is therefore now making rapid strides.

It is the aim of every merchant and manufacturer to dispose of his goods at a price which will return to him, first, the cost of the article, including his expense of doing business, and, secondly, such a profit over and above the cost as will return to him a fair rate of return on the capital invested. Therefore, in fixing prices he starts as a rule with what he considers cost. The difficulty arises when his information regarding cost is inaccurate or misleading. In his effort to develop his business he undersells his competitors, and when these prices are met he shades them again, not knowing exactly when the point of danger is reached or passed.

And so, as competition increases and prices are reduced, the weaker operators perforce drop out. The demand presently exceeds the supply, the prices rise, thus rewarding with generous profits those who survive. This new condition attracts new enterprises. The supply increases and prices fall again. The result is that in many industries extraordinarily prosperous periods alternate with exceptionally lean periods. These alternate periods of prosperity and depression are due partly, no doubt, to causes beyond the control of the particular industry, but it must be admitted that they are caused largely by faults and mistakes within the industry itself.

The profit factor is usually so small as compared with the cost of an article that any error in the costs, although the error may appear trifling in amount, must affect the profit factor by a very considerable percentage. For instance, suppose an article to cost $1.00 and to sell at a net profit of 5c; an error of 1c. in the costs, or only 1 per cent of the whole, would encroach upon the profit to the extent of 1c. out of 5c., or 20 per cent thereof. Thus, it is seen that an error in the cost of an article has an effect on the net profit out of all proportion to its apparent importance.

A business may show a profit as a whole and yet it may not necessarily follow that profits have been earned on each item of merchandise, for losses on one class of goods may be more than offset by profits on other classes. The result of such a condition can only mean, in the long run, the loss of the profitable business to competitors and the retention of the unprofitable business which no one else wants.

EVERY SINGLE PRODUCER in the Rock Products industry ought to read and absorb this article. It is reprinted from "The Nation's Business" for July—the mouthpiece of the Chamber of Commerce of the United States. If you have already read it there, read it again now.

Price Cutting and the Public

NO merchant knowingly sells an article below its actual cost, unless perhaps under very exceptional circumstances. It follows, therefore, that cutting of prices, resulting in keen competition, is generally the direct result of erroneous cost figures. If by cutting prices the merchant hurt only himself there could perhaps be no valid complaint, as he would very likely soon eliminate himself. But the effects of unsound competition must be considered in their relation not only to the individual, but as well to the industry as a whole, and to the consuming public.

By unsound business practices the individual ruins himself, brings down with him many of his competitors who must meet his competition, involving them all in losses for a time, and subjects the consuming public to erratic and violently fluctuating markets. If every member of an industry were fully informed as to his costs, the danger of under-selling and price-cutting would be almost eliminated.

In recent years it has come to be recognized, therefore, that one of the most important activities of trade associations is to promote interest in accurate systems of accounting and to aid every member of the association with the installation of such systems.

Thus, what is specifically prohibited by the Sherman Law, viz, the fixing of prices by agreement, is practically accomplished without effort and without direct design merely by making certain that every member of an industry knows his true costs, and then relying upon every individual to follow self-interest and fix prices based on sound economic principles.

Clean competition ought to center around quality and service rather than price. It needs no salesman to secure orders at cut prices; anyone can do it. The variation in the market prices of articles of the same kind will tend to become of decreasing importance with the spread of more accurate cost accounts.

When a materially lower price does appear it will be the direct consequence of more efficient operation and it would be only fair that the efficient operator should reap the benefit of his enterprise. But efficient operation and the elimination of waste are themselves among the most important objects to be achieved with the aid of accurate accounts.

In speaking of the advantage of accurate knowledge of costs one is often met with the argument that the selling price is, after all, based upon the market made by other sellers, and that no individual merchant can exercise any control over the price. This argument is, of course, childish, for in the long run the cost of production plus a profit must be recovered in any industry, and the sooner the real cost is known the sooner will the price find its economic level. Moreover, the man who knows it first will be the one to profit by knowledge.

The surest way to prevent any article being held for sale at an economically unsound price is to have reliable data regarding its cost most widely disseminated.

Although business men may be in sharp competition with each other, they have in fact a very well defined community of interest. The unsound and uneconomic practices of an operator affect directly or indirectly every other operator in the same line. An enlightened self-interest, therefore, demands every effort on the part of all to prevent each individual from creating disturbed business conditions. No other one thing will so help to stabilize trading as full knowledge on the part of all as to the real cost of production and of distribution, and to secure this knowledge is a matter of comparative simplicity.

Makers of Building Materials Face Rising Costs and Other Troubles

Demand for Many Basic Materials So Strong, Stock Accumulations Are Prevented

NEW YORK—Building material manufacturers and distributors are sensing a cost crisis as they view the late fall and spring building movements, according to The Dow Service Daily Building Reports.

This crisis finds expression in the general tendency of manufacturers to rush production, to replenish depleted stocks and at the same time meet current delivery conditions. The point of greatest difficulty, however, seems to be, in most basic and supplemental departments, that something approaching a stampede is developing throughout the country for building material supplies that is preventing satisfactory stock accumulations.

According to the opinion of building material manufacturers in session the week ending July 12, the cost of building material production is increasing out of hand, while any compensating adjustment at the consuming end of the market is met with threats of legal retaliation, strikes that have sympathetic flavor and a general charge of profiteering. The alternative, in some lines, at least, is to stop producing if production cannot proceed at a fair commercial margin. Indeed, some of the plants supplying this market with brick, lumber and several other basic commodities, have had the matter before their directorates within the last few weeks.

In exportable materials, like cement, steel, etc., increased production is the tendency. One of the largest cement companies will issue orders soon for maximum production at its various plants, in so far as labor conditions will permit. Cement, still showing the lowest percentage of increase in price since the signing of the armistice, or 7½ per cent, is meeting forward buying movements representing heavy road building, some export business and some effort on the part of distributors to be covered for possible eventualities in the building material and labor markets late this fall or early next spring.

There is an important transformation taking place in the building material production and consuming situation, affecting the entire country. In brief, it is taking the form of a preventive against an epidemic of feeling that the building trades are entitled to recover their huge war time losses in peace times at the expense of the investor who is enterprising enough to proceed with his building plans.

Manufacturers are becoming increasingly aware that the degree of maximum elasticity between wage scales and prices for finished products and the cost of the finished product to the consumer and his return on his investment in the completed building is almost, if not quite, reached. The alternative, in the minds of foremost analysts is to increase production of building materials, which are now so far behind the country's potential demand as to require at least five years of maximum plant outputs for the whole United States to even permit the country to catch up to normal conditions, before the first thought could be given to building material price reduction. This construction represents necessary construction of all kinds and does not include speculative building work in the sense usually accepted five years before the war. Some believe that it may yet be necessary to effect the labor shortage by modifying existing oriental immigration laws, as a temporary expediency. This sort of labor could be used in basic building material plants and thus speedily replenish the supply and lower construction costs.

General building material prices continue upward trend. Price advances are expected this week of one dollar a ton in cement neat and wood fibre plaster neat. One cent has been added to the cost of plaster boards.

Building Statistics for June Indicate Better Business

RAPID increase in volume of building operations during the first six months of 1919 as indicated by building permits issued in representative cities of the United States is outstanding proof that the construction industry is surging into real action.

The first of the year was quite naturally lean. Building had been almost completely paralyzed by war time restrictions. In January 152 cities reported only $23,869,215 estimated value of permits issued. This was a decrease from the first month of 1918, which from the same cities showed a $27,291,218 estimated value of permits issued.

June reports coming from 158 cities as officially reported to The American Contractor give an estimated value of $134,726,715 as compared to an estimated value of $47,793,182 for permits issued during June, 1918. The per cent gain is 182.

The following tabulation shows the relative increase in estimated value for the first six months of 1919 as compared to the corresponding period for 1918:

Month	No. Cities	1919 value	1918 value	Pct. gain
January	152	$ 23,869,215	$ 27,291,218	*12
February	153	32,058,628	21,680,314	48
March	169	64,884,325	36,529,620	77
April	165	84,914,008	44,516,828	91
May	168	112,678,640	51,764,746	110
June	158	134,726,715	47,793,182	182
Total		$453,131,531	$229,575,908	83

*Loss.

A comparison of June figures for the last six years is as follows:

Year	Number cities	Number permits	Estimated value
1919	158	39,625	$134,726,715
1918	158	21,062	47,793,182
1917	117	21,276	61,287,611
1916	107	26,593	91,768,080
1915	107	24,488	63,890,866
1914	67	.....	71,246,141

Milwaukee County Statistics Prove Good Roads Save Much Money

THE improved roads of Milwaukee County, Wis., save $25,000 a day to the people who use them. This is the estimate of the county commissioner of highways, as reported to the Bureau of Public Roads of the United States Department of Agriculture.

The statistics are based on a census of the traffic taken periodically during the past four years. The census is made by selecting 52 points scattered throughout the county, and making seven counts at each point, one for every day of the week. The count is not made on consecutive days, but at various periods from April to November, so as to arrive at average conditions.

This census is taken to determine the durability of certain types of pavement, according to the amount of traffic a square yard. It shows that about 25,000 vehicles of all kinds travel the highways each day. Traffic on the road has increased about 42 per cent a year during the four years of the survey.

Indianapolis Building Record Broken

ALL RECORDS for building operations in Indianapolis were broken in June, according to figures given out by J. C. Hayes, chief clerk in the building commissioner's office. Eight hundred and four permits for new buildings and alterations were issued during the month, the total valuation of the improvements being listed at $1,044,260. In April 802 permits were issued and more than 2,400 were issued in the quarter ending July 1, 1919.

NEW MACHINERY AND EQUIPMENT

The Henry Shaker Screen

A TYPE OF SHAKER SCREEN used considerably in the dressing of lead and zinc ores in the Joplin district of Missouri is known as the Henry screen. The mechanism of this screen is illustrated in the accompanying sketch.

The main frame carries the mechanism that transmits movement to the screen. Within the frame is a hopper-shaped tank, with ample pitch to prevent fine material adhering to the sides.

The driving shaft carries two eccentrics. One of these connects directly to the screen carrier and imparts to the screen a forward-and-backward movement. The second eccentric leads the first 90 deg., and by means of arms, gives the screen an up-an-down movement. The mean of these two movements combined is a rising forward movement during one-half of the revolution of the main shaft, and a downward movement during the other half revolution.

The material is fed into the rear end of the screen (left). The resulting action of the screen from each revolution tends to carry the over-size material to the forward end of the screen, where it is discharged; the undersize passes through the screen into the tank, where it is drawn off at the bottom by means of a spigot plug.

The water that carries the sand to the screen of course passes through into the tank, where its level is maintained by means of an adjustable gate or weir, at a point just below the level of the screen when it is at midstroke. The blades supporting the screen are securely joined to both sides of the screen carrier.

These blades are so shaped that during the downward backward movement of the screen carrier they dip into the water and force it up against the screen with a pulsating effect, thus cleaning the openings in the screen and assisting the forward movement of the oversize material. As the screen lifts forward from the water the fines are washed through the openings and the coarse material on the screen is thoroughly cleaned.

You Must Find Machines to Supplant Labor

IN THE FOUR YEARS ending December 31, approximately one million immigrants came into this country, although the number each year steadily decreased, and in 1918 the net increase in population through immigration was only about 16,000. In the first six months since the armistice nearly 400,000 emigrants have left the country through the port of New York alone. Nearly 1,400 requests for passports to Europe are now being received daily at New York. From these figures it is estimated that in the first five months of this year this country has sustained a net loss of 250,000 in population, or a decrease of 50,000 annually, and that the result will be a serious shortage of common labor.

Machinery builders and nventors should be busier now than ever before. This page of ROCK PRODUCTS is wide open to any manufacturer who has a new machine or device for use in the rock products industries.

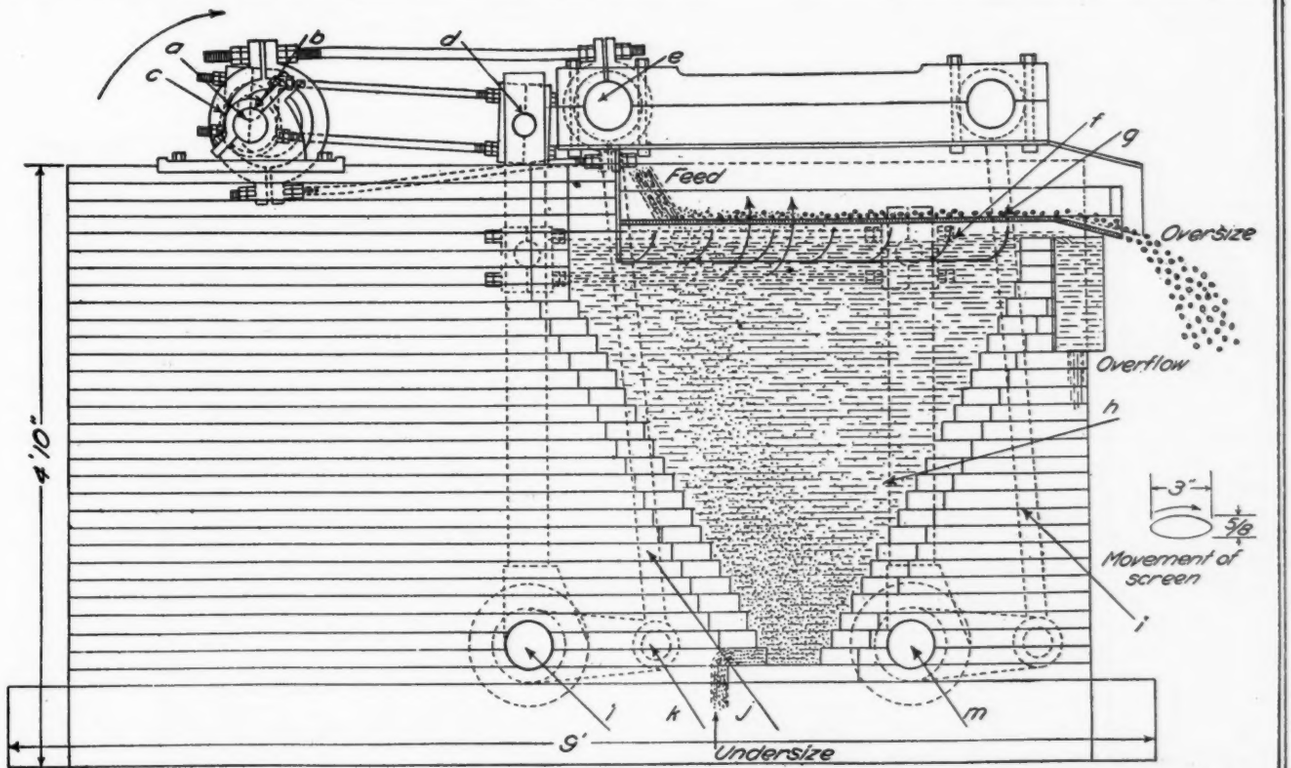


FIGURE 11.—Sketch of Henry screen. *a*, main shaft; *b*, vertical motion crank; *c*, horizontal motion eccentric; *d*, quadrant; *e*, connecitng box; *f*, blades; *g*, screen; *h*, hutch; *i*, *j*, carrier legs; *k*, quadrant; *l*, rear rocker shaft; *m*, front rocker shaft.

A type of machine in common use in lead and zinc plants of the Joplin,Mo., district

General News From The Rock Products Markets

Home Contest in Kansas City Used to Better Building Material Business

KANSAS CITY, Mo.—The Kansas City Star, folowing the suggestion of the Kansas City Real Estate Board, is conducting a "most beautiful home" contest. Homes in Kansas City builded and inhabited before October 1 are eligible for competition for the cash prizes, totaling $600. The contest is divided into three classes; homes costing less than $7,500, homes costing more than $7,500 and less than $15,000 and homes costing more than $15,000.

A feature of the contest is that a complete enumeration and description of the building materials used in the construction of the residence must accompany the photographs and floor plans of all houses entered in the contest. It is thought that this will give the public a rather thorough knowledge of what materials are best adapted to the construction of the residences in this locality, and will be a good boost for the building materal dealers, in future business.

Close Contract for 300,000 Barrels of Cement

CLEVELAND, O.—Announcement has been made by the United States Steel Corporation of the closing of a contract for 300,000 to 400,000 bbls. of Portland cement with the Cleveland Union Terminal Co., says the Cleveland News. This is one of the largest cement contracts of the kind ever closed. The cement is to be used in construction of approaches to the new station and in the viaduct which will carry the tracks over the Cuyahoga river.

Ossining, N. Y., Unable to Get Crushed Stone Fast Enough

OSSINING, N. Y.—Work upon the city streets or those sections which are to be oiled and covered with crushed stone is delayed by the fact that shipments of crushed stone are coming along slowly, despite the fact that the quantity required was ordered as soon as the decision was reached to use them in topdressing many of the city streets.

The trouble arises from the fact that the quarries have no storage capacity and usually they are able to fill all orders received direct from the crusher to the cars. This year, however, so much stone is being used in all departments of public work as well as in private building operations that the quarries are crowded beyond capacity and unable to keep up with the order.

Kelley Island Company in New Building Supply Combine

A COMBINATION of building supply interests was recently effected in Cleveland, Ohio, in which the Kelley Island Lime and Transport Co. and its officers took a leading part.

The new company will be known as the Cleveland Builders Supply and Brick Co. In it are united the Barkwill-Farr Co., the Camp Conduit Co., the Kelley Island Lime and Transport Co., the Pelee Island Sand and Gravel Co., and the Lakewood Masons Supply Co.

The extent of the combine may be realized from the fact that not less than fifteen producing plants of building materials, brick and tile and other clay products, will be under the control of the company, and that it will have at least 20 main distributing points. All of these will be within the district known as Greater Cleveland.

Officers of the new company are: President, John A. Kling; first vice president, E. S. Barkwill; second vice president, W. T. Rossiter; secretary, Herman Schmidt; treasurer, L. B .Koblitz.

Directors include the officers and E. W. Farr, C. G. Barkwill, C. L. Bradley, H. H. Camp, R. J. Dawson and Henry Angel. All of these officials have been prominently identified with one company or the other included in the pooling of interests.

It is announced that the assets of the company will be more than $10,000,000.

"The chief object of the uniting of these interests," said E. W. Farr, "is to keep prices for these materials down in Cleveland through more economical management. Uniting of interests will do this, we believe."

Offices of the new company will be at 10th floor, Leader-News building. The offices of the various concerns involved in the merger will be continued for a time, according to Mr Farr, but this will be only for the purpose of permitting them to clean up their individual affairs. No business under the new merger will be done at these separate offices.

"There will be no disruption in the forces of the separate concerns, however," said Mr. Farr. "All those in executive capacity will be taken into the new company. In fact their places have already been selected for them. All the help in the different plants and warehouses will very likely be retained, as the demands upon all these establishments, as far as management and handling of the materials is concerned, has been greater than we could care for, and we will need them all."

Mississippi Valley Building Business Growing

MEMPHIS, Tenn.—Good roads enthusiasts from Arkansas, Tennessee and Missouri attended the organization meeting of the south central highway division of the Mississippi Scenic Highway Associaton Convention at Cape Girardeau, Mo., July 15. The convention was called to effect a formal organization. The highway projected will run from St. Louis to Memphis on the west side of the river. Thos. B. King, chairman of the Chamber of Commerce Roads Committee, attended from here. Crittenden and Mississippi counties, Ark.; Dunklin, Pemiscot, New Madrid, Scott, Cape Girardeau, Perry, Ste. Genevieve, Jefferson and St. Louis counties, Mo., are included. The counties on the east side of the river are contending for the route. The scenic highway, a proposed tourist and military road. with hard surface, paralelling as nearly as possible the Mississippi river, begins at Lake Itasca and ends at New Orleans. As far south as St. Louis, it is stated, organization has been perfected.

July Market Conditions

The July market conditions on sand and gravel at Memphis shows more activity than at any time in the spring or summer. Building is opening up well, $300,000 of permits being issued the first week of July, more than the total of June this year, and more than the total of June, July and August last year. This is having some effect on sand trade. Road and street construction work is strengthening tone of gravel market. River and pit operators are active.

Marshall and Little, contractors, have the contract to build about 100 miles of road in Bolivar County, Miss. Some of the gravel is being handled by truck from Shelby, Miss. The issue of road bonds in the sum of $400,000 was made.

Greenville, Miss., has ordered an election July 28 to authorize the issuance of bonds in the sum of $225,000 for public improvements. Of this amount $100,000 is for the extension of the street paving.

Bids for road construction in Franklin and Bedford counties were opened July 10. These are for the construction of 11 miles of the Dixie Highway in Franklin County. This work will cover all unimproved sections of the Dixie Highway between Chattanooga and Nashville, except a strip in Marion county. It is also hoped to have improvements made on the Rutherford County section soon.

General News From The Rock Products Markets

Kansan Organizing Company for Production of New Concrete Aggregate

KANSAS CITY, Mo.—S. J. Hayde, a well known builder at Kansas City, is organizing a company for the mining and burning of a clay aggregate which, mixed with cement, forms the basic material for the construction of concrete ships and railroad cars. The company plans the immediate erection of a plant costing more than $200,000. Mr. Hayde discovered the value of the clay aggregate here several months ago and a great deal of it was mined and burned and mixed with cement at the Builders Brick and Manufacturing Co. for the use of the government in building concrete ships.

The clay shale found here is said to be of a better quality than that mined in other localities. Mr. Hayde claims that it has proved to be at least 30 per cent stronger than any other aggregate that has been used in concrete construction. Joseph B. Strause, of the Builders Brick and Manufacturing Co., and Mr. Hayde, built the concrete railroad car, using the mixture known as "Haydite," which was accepted by the United States Railroad Administration for a complete wrecking test. After the test the administration ordered 10,000 of the concrete cars.

Sand Dredgers Busy in Kaw and Missouri Rivers

KANSAS CITY, Mo.—Dredging for sand in both the Kaw and the Missouri rivers has been progressing without interruption all the spring and summer season. The companies had plenty of sand stored for winter usage last year, before they were forced to cease operations because of the ice in the rivers. It is generally thought that the winter's supply this season will be increased for the dredgers are working to full capacity.

The Stewart Sand Co., the largest operators on the Kansas City market, recently painted its trucks a sand color with appropriate lettering. They are attractive vehicles.

Cement has remained at a steady price on the Kansas City market, the quotations not varying to any great degree. The demand continues heavy and shows indications of a good increase. Building supply companies are reporting that the outlook for the summer season is exceptionally good at the present time.

Illinois Road Contracts Are Being Awarded Promptly

REPORTS RECEIVED during the past week indicate considerable improvement throughout the state north of a line that may be drawn east and west through Centralia. Construction work has been somewhat slower getting started in the regions south of such a line, but indications are that there will be some nice business down there by the end of harvest.

Road contracts are being awarded more promptly after bids are in and a great deal of construction work is already under way. Production is the real problem now at a number of plants and it will not be at all surprising to see a greatly increased demand by the first of August, says the Illinois Sand & Gravel Producers Association Bulletin.

It is earnestly hoped producers will not minimize seriousness of the prospective car shortage and will awaken customers, particularly the dealers throughout the state, to the importance of stocking their season's requirements now. Contractors also should be urged to install storage facilities wherever possible. Car orders should not be limited as to number of tons or size of car, and under no circumstances should a car be loaded with less weight than 10 per cent over its carrying capacity.

Temporary Sidetracks

CONTRACTORS may have temporary sidetracks constructed by paying cost of labor plus legal rate of interest on value of material in the track, provided track is located on railroad property. Applications for sidetracks should be made direct to division superintendents, but must be approved by traffic officials before construction can be authorized. For prompt action such applications should be followed up closely.—Illinois Sand and Gravel Bulletin.

Trap Rock Prices in Rhode Island

THE STREETS and bridges committee of the Woonsocket City Council has accepted one of the four bids submitted for trap rock, the bid of the Hamlet Trucking Co., whose prices were $2.40 per ton for No. 1; $2.55 per ton for No. 2; $2.65 per ton for No. 3, and $1.10 per ton for screenings. These prices are quoted for delivered stock. If not delivered $1 per ton is taken off the above figure. Bids were received from the Globe Coal Co., the New Haven Trap Rock Co., and the Connecticut Quarries Co.

Warn Your Customers That to Escape Car Shortage to Order Now

REFERENCE has been made several time in ROCK PRODUCTS to an impending shortage of open-top cars. Evidence is daily accumulating that such a period is coming. Ben Stone, business director of the Illinois Sand & Gravel Producers Association, gives this warning and advice to producers of mineral aggregates:

"Those in a position to know are daily predicting that August will bring with it one of the most acute shortages the country has ever known, particularly as regards open-top cars. To one in any way familiar with conditions as they have been and are it is not difficult to understand that such a fear is well grounded.

"The summer movement of coal has not been so light for a long, long time. The coal operators are doing a great deal of advertising just now in an effort to awaken dealers and the public, and a number of railroads are also sending out warnings. A large coal movement is anticipated, beginning about August 1.

"We all know approximately what the demand will be for open-top cars to load sand, gravel and crushed stone during the remainder of this year. In addition, the enormous movement of grain and other commodities will undoubtedly create considerable congestion at various terminals throughout the country, which will have the effect of slowing up car movements and further reducing the available supply of empties. While we are not sure that it would be practicable for this Association to undertake a campaign such as is being carried on by the coal people and some other industries, I do believe every effort should be made to have the dealers put in stocks during the balance of this month sufficient to carry them through the season.

"The producer who warns his customers now of the impending car shortage will find it much easier after while to explain his inability to make prompt shipments. Another way you can help is to load each car 10 per cent above its marked capacity and have everyone in your organization alive to the importance of releasing equipment promptly."

Shortage of Box Cars, Too

The Lime Association is urging its members to bring the attention of their customers to the approaching shortage of box cars. The railways are about to move the largest grain crops on record and box cars will soon be hard to get.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Akron, N. Y.	.60	.60	1.00	1.00	1.00	1.00‖
Auburn and Syracuse, N. Y.	.80	1.20	1.20	1.20	1.20	1.20
Buffalo, N. Y.			Railroad ballast, 1.00			
Burlington, Vt.	1.50		$1.00 per ton, all sizes 3.00	1.75	1.75	
Chaumont, N. Y.		1.75	1.65	1.35@1.50	1.25	1.25
Coldwater, N. Y.			All sizes 1.50			
Coldwater, N. Y.			Flux, 1.50@2.10			
North LeRoy	1.00	1.00	.75	1.00	1.00	1.00‖
Walford, Pa.	1.25	1.40	1.50	1.50	1.50	1.50
CENTRAL:						
Alden, Ia.	.40		1.00	1.00	1.00	
Alton, Ill.	1.80		1.50	1.40		
Anna, Ill.			1.00@1.25 for prepared sizes			
Belvidere, Ill.			1.00 for any size produced			
Bettendorf, Ia.	1.25	1.25	1.25	1.25	1.25 (2300 lbs).	
Brillion and Sherwood, Wis.	.90@1.00		1.00	1.00		1.00
Davenport, Ia.	1.40	1.30	1.30	1.20	1.20	1.20
Dundas, Ont.	.65	1.05	1.05	1.05	.85	.85
Eden and Knowles, Wis.	.80@1.00	.80	1.00	1.00	1.00	1.00
Elmhurst, Ill.	(¼-in. 1.25)		1.00 (Sc'gs .85)		.85	.85
Grass, Mich.			1.00, all sizes			
Greencastle, Ind.	1.00@1.25	1.10	1.00	.90	.90	.90
Illinois, Southern	1.50	1.25	1.25	1.25	1.00	
Kokomo, Ill.			.90@1.00 all sizes			
Lannon, Wis.			1.00 all sizes			
Lima, O.			1.10 for any size			
Mankato, Minn.			(1-in. 1.50)		(2-in. 1.25)	
Mayville, Wis.	.75	1.00	1.00	1.00	1.00	1.00
McCook, Ill.	.90@1.10	1.50	.80@1.00	.70@ .85	.70@ .80	.70@ .80
Oshkosh, Wis.			1.00 in all sizes, Blue Limestone			
River Rouge, Mich.	.80@1.15	1.15	1.15	1.15	1.15	1.15
Sheboygan, Wis.			1.00 for all sizes			
Stone City, Ia.	.50		(1-in. 1.40)	1.30	1.20	
Toronto, Can.	1.55	1.95	1.95	1.95	1.75	1.75
			These prices include 90c freight			
SOUTHERN:						
Brooksville, Fla.	1.00			2.50		
Cartersville, Ga.		1.80	1.85	1.75		1.65
Fort Springs, W. Va.	1.00	1.20	1.40	1.60	1.40	
Hopkinsville, Ky.	1.10			1.00	1.00	
Mascot, Tenn.		1.00	(Chatts)			
Memphis Junction, Ky.			Average 1.10			
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.70	1.70
			Rip-Rap, 1.30			
Blue Springs and Wymore, Neb.		1.55		1.45@1.50	1.35@1.40	1.30
Dittlinger, Tex.			1.20	1.00	.90	
El Paso, Tex.			1.00 for all sizes			
Kansas City, Mo.	.60	1.35				

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.—Trap		2.40*	2.40*	(1¼ in.	and less,	2.20*)
			Bronze, top of quarry, 1.50*			
Birdsboro, Pa.—Trap	1.25	1.80	1.70	1.60	1.50	1.25
Branford, Conn.—Trap	.80	1.25	1.25	1.10	1.00	
Castro Pt., Richm'd, Cal.—Trap	.50*		1.40*	1.30*	1.20*	
Duluth, Minn.—Trap	.65@ .75	1.40@1.50	1.25@1.35	1.10@1.15	1.10@1.15	1.00
Glen Mills, Pa.—Trap	1.00	1.35	1.70	1.55	1.35	1.40‖
Millington, N. J.—Trap	1.80	1.80	1.80	1.60	1.40	
New Britain, Conn.—Trap	.75	1.20	1.15	1.10	1.00	
Oakland, Calif.—Trap		1.75*	1.75*	1.75*	1.75*	
Rock Hill, Pa.—Trap	1.00	1.35	1.70	1.55	1.35	1.35‖
Westfield, Mass.—Trap	.60	1.20	1.20	1.00	.90	
Winchester, Mass.	.75	.75	1.60	1.45	1.25	1.25‖

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.60		2.85	2.35	2.35	
Fair Oaks, Calif.—Cr. Bldrs.	.85	1.05	.95	.85	.85	
Hendlers, Pa.—Quartzite	.80	1.00	1.25	1.00	1.00	1.00‖
Little Falls, N. Y.—Syenite	.80	1.20	1.40	1.20	1.20	1.20‖
Middlebrook, Mo.—Granite	3.50		1.75	1.75		1.00‡
Roseburg, Ore.		1.50	1.25	1.05	1.00	1.00
Smith Siding, Richmond, Va.—Granite	1.25		1.50	1.50	1.50	
Stockbridge, Ga.—Granite	.75	2.00	1.75	1.75	1.75	
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20	1.20‖

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone Wholesale at Plant, per Ton

EASTERN:

Coldwater, near Rochester, N. Y.—Analysis: $CaCo_3$, 56.77%; $MgCo_3$, 41.74%—80% thru 100 mesh; ppr., 4.50; bulk 3.00

Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); ppr., 4.00; bulk..... 2.50

Cobleskill, N. Y.—Ppr., 5.00; bulk..... 3.00

Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk.... 3.25

Hillsville, Pa.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 1½%—(70% thru 100 mesh) in 80 lb. ppr. bags, 4.25; bulk..... 2.75

Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk..... 2.25

Lime Kiln, Md.—50% thru 50 mesh; bulk 4.00

Pownal, Vt.—(50% thru 100) Analysis, $CaCo_3$, 90%; $MgCo_3$, 5%; ppr., $4.50; bulk 2.75

Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk..... 2.75

West Stockbridge, Mass.—Analysis: $CaCo_3$, 95 to 98½%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk 2.85
In cloth bags, 3.10. Bag charge, 10c; returnable.

CENTRAL:

Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, .75%—90% thru 100 mesh.. 3.00
50% thru 50 mesh..... 2.00

Anna, Ill.—Ground; bulk..... 1.25

Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, 98.5%; $MgCo_3$, 0.5% 1.75

Belleville, Ont.—90% thru 50 mesh..... 2.50

Canton, O.—100% thru 10 mesh; 40% thru 100; 59% thru 50..... 3.00

Columbia, Ill., near East St. Louis—(⅛" down) ..... 1.25@1.80

Elmhurst, Ill. — (Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh 1.25

Greencastle, Ind.—(Analysis, $CaCo_3$, 98%) 50% thru 50 mesh..... 1.75

Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100..... 2.75@3.00

Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$ 2.00

Marble Cliff, O.—(50% thru 100 mesh) Analysis, $CaCo_3$, 86%; $MgCo_3$, 8%.... 3.00

Marblehead, O. — (Analysis: $CaCo_3$, 95.33%) 50% thru 100 mesh..... 3.00@4.50

McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04% — 100% thru ¼" sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 26.04% thru No. 50; 16.27% thru 100 ..... .90@1.00

Milltown, Ind.—Analysis, $CaCo_3$, 94%; $MgCo_3$, 3% 1.50

Montrose, Ia.—(90% thru 100 mesh).. 1.25@1.35

Muskegon, Mich.—(90% thru 50 mesh) Analysis, $CaCo_3$, 53.35%; $MgCo_3$, 43.27% 2.50

Piqua, O.—Analysis: $CaCo_3$, 32.8%; $MgCo_3$, 3.2%; neutralizing power in terms of calcium carbonate, 95.3%—70% thru 100 mesh, bulk..... 2.50@4.00

Rockford, Ill. — Analysis, $CaCo_3$, 53.75%; $MgCo_3$, 44.35%..... 1.25

Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ⅛" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82% 1.50

Stone City, Ia.—(90% thru 50 mesh) Analysis, $CaCo_3$, 98%..... .50

(Continued on next page.)

Agricultural Limestone Wholesale at Plant, per Ton

(Continued from preceding page.)

Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh; 30% thru 50; 80% thru 100; 100% thru 5/32 screen)	1.80
Whitehill, Ill. — Analysis, $CaCo_3$, 96.12%; $MgCo_3$, 2.50%—	
50% thru 50 mesh, bulk	1.50
90% thru 100 mesh	5.00
SOUTHERN:	
Dittlinger, Tex. — Analysis, $CaCo_3$, 99.09%; $MgCo_3$, 40%.	
90% thru 100 mesh	2.00
90% thru 4 mesh	1.00
Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh	2.50
Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk	2.00
Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%) average price	2.00
Ladds, Ga. — Analysis: 96 to 98% combined carbonates—All thru 10 mesh with all dust in	2.50
Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.	
(80% thru 100 mesh)	2.50
(80% thru 200 mesh)	3.50
(All thru 10 mesh)	2.00
Paper bags $1.50 extra per ton; burlap, 2.00 extra per ton.	
Tyrone, Ky.—Analysis, $CaCo_3$, 90%; $MgCo_3$, 5%—90% thru 4 mesh	1.50@1.75
Winnfield, La.—(50% thru 50 mesh)	4.50
WESTERN:	
Fresno, Calif.—(Analysis, $CaCo_3$, .94%; MgCo, .02%) 50% thru 200 mesh; 90% thru 100; 100% thru 40. Prices for delivery: Sacks, 6.50; bulk Sacks, 10c each.	6.00
Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk	1.50

Miscellaneous Sands per Ton at Plant

Silica sand is quoted washed, dried and screened, unless otherwise stated.

GLASS SAND:	
Berkeley Springs, W. Va.—Glass	2.00@2.10
Special hand selected rock	2.50
Bowmanstown, Pa.—Glass sand	2.50
Cedarville and South Vineland, N. J.—	
Glass, damp	2.00
Glass, dry	2.50
Gray Summit, Mo.—Glass	2.00@2.50
Guion, Ark—Glass on contracts	1.50
Hancock, Md.—Engine and glass	2.50@3.00
Klondike and Pacific, Mo.—Glass:	
Contracts	2.00
Carlots	2.50
Mapleton, Pa.—Glass, dry	2.50@2.75
Glass, damp	2.00@2.25
Massillon, Ohio—Glass	3.00
Michigan City, Ind.—Glass sand	.40
Millington, Ill.—Glass	1.75@2.00
Mineral Ridge, O.—Glass	2.75
Montoursville, Pa. — Glass, green, washed	2.00@2.75
Ottawa, Ill.—Glass	2.00
Large contracts	1.75
Sands, Elk Co., Pa.—Glass sand:	
Selected, green	2.50
Thayer, W. Va.—Glass	2.75
FOUNDRY SAND:	
Albany, N. Y., at plant—Core	1.25@2.25
Molding, fine and coarse	1.65@2.00
Sand blast sand	1.50@3.00
Brass molding	1.65@2.00
Allentown, Pa.—Core	1.20@1.40
Arenzville, Ill.—Molding fine	1.50
Berkeley Springs, W. Va.—Roofing	2.00
Bowmanstown, Pa.—Core	1.25
Molding fine or coarse	1.50
Roofing sand	3.00
Cedarville and So. Vineland, N. J.—	
Core, damp	2.00
Core, dry	2.50
Cleveland, O.—Core, on car	1.00@1.25
Molding fine, on car	1.75@2.25
Molding coarse, on car	1.50@2.25
Brass molding, on car	1.25@2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.60	.60	.60	.75	.75	.75
Boston, Mass. (On Boston docks)	1.25	1.00	1.75	1.70	1.60	1.60
Buffalo, N. Y. (Niagara River)	.80	.80	.75	.75	.75	.75
Farmingdale, N. J.		.43	1.25		1.05	
Morristown, N. J.	.60	.60	1.20	1.00	1.00	
Pittsburgh, Pa.		.90@1.00		.90@1.00	.70@ .80	.70@ .80
Washington, D. C.—Wharves	.75	.75	2.00	1.40	1.20	1.20
CENTRAL:						
Anson, Chippewa Co., Wis.		.50	.95	.95	.85	.85
Barton, Wis.	.75	.70	1.00	.70	.70	.70
Chicago, Ill.	1.30@1.35*	1.25@1.30*	1.30@1.75*	1.25@1.30*	1.30*	1.25@1.30*
Chicago prices, F. O. B. cars initial railroad line. At pits in Chicago districts, .50@ .65*						
Cincinnati & Miami Grove, O.	.60@ .80	.55@ .75		.55@ .75	.55@ .75	
Columbus, O.	.65	.65	.60	.70	.70	.65
Des Moines, Ia.	50@1.00	.50	1.50	1.50	1.25	1.25
Earlestead, near Flint, Mich.	.55@ .60	.55@ .60		.85@ .90	.75@ .80	.75@ .80
Escanaba, Mich.		.90	1.60	1.20	1.00	.90
Fort Dodge, Ia.	1.10	1.00	1.80	1.80	1.80	1.80
Fort Jefferson and Mechanicsburg, O.	.40@ .60	.40@ .60	.40@ .60	.50@ .70	.50@ .70	.50@ .70
Grand Rapids, Muskegon, and Holland, Mich.		.40@ .50	.60@ .70	.80@1.10	.70@ .80	.70@ .80
Hersey, Mich.	.50	.50		1.00	1.00	.75
Illinois, Northern Points	.60	.60@ .70	.70	.70	.60@ .70	.50@ .60
Indianapolis, Ind.		.50			.65	
Janesville, Wis.	.50	.50	(Wisconsin shipments)		.60	
Lafayette, Terre Haute and Richmond, Ind.	.40@ .60	.40@ .60	.40@ .60	.50@ .70	.50@ .70	.50@ .70
Mason City, Ia.	.60	.50	1.45	1.35	1.30	1.25
Railway ballast and road work, .40 1.20 for all sizes						
Milwaukee, Wis.						
Moline, Ill.	.60	.60@ .80	1.20	1.10	1.00	1.00
Montezuma, Covington, Ind.	.75	.75	.85	.75	.75	.75
Oxford, Mich.		.55	.90	.90	.80	.80
Rockford, Ill.	.60@ .65	.60@ .65			.60@ .65	
Saginaw, Mich. (Includ'g frt.)	.95	.95	1.60	1.60	1.60	1.45
St. Louis, Mo.		2.20	2.20	2.20	2.00	1.75
Mississippi sand, 1.90; Meramec river sand, 1.95						
St. Louis, Mo., F. O. B. cars	1.35	1.20	1.50	1.30		1.25
Summit Grove, Ind.	.75	.75		.75	.75	
Terre Haute, Ind.	.75	.75	.75@ .85	.75	.75	.75
Winona, Minn.		.70	1.60	1.10	1.10	1.10
SOUTHERN:						
Dudley, Ky.	.90@ .95	.90@ .95		.90		
Flomaton, Ala.		.80		1.50		
Knoxville, Tenn.	.85	.85	1.35	1.35	1.35	1.10
Lake Weir, Fla.	.50					
Macon, Ga.		.60				
Memphis, Tenn.	.80	.80			1.00	
New Martinsville, W. Va.	1.30	.90@1.00		1.00		.60@ .80
Pelzer, S. C.	.55					
Roseland, La., and Condron, Miss.		.40		1.00		
Thomas, La.	.60					1.75
Waco, Texas	.80	.67				1.05
WESTERN:						
Kansas City, Mo.	.60	.60				
Lincoln, Neb. (on cars)	1.00	1.00	2.10	2.10		1.90
Pueblo, Col.	.80*	.60*			1.50*	
Roseburg, Ore.	1.50	1.00	1.25	1.00	1.00	1.00
San Francisco, Calif.	1.00@1.25	1.15	1.20	1.20	1.20	1.20
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*		1.25*
Vancouver, B. C.		1.10*		1.30*		1.10*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.50	.50	.50	.65	.65	.65
Boonville, N. Y.	.65	.45@ .65				.60
Lowell Junction, Mass.	.75*	.65*@.75*	.60*			
Pittsford, N. Y.		.50@ .55			.50@ .60	
Yardville, N. J.		.50@ .75				
York, Pa.		1.00@1.10	(crushed rock sand)			
CENTRAL:						
Anson, Chippewa Co., Wis.	.65, all sizes					
Beloit, Wis.		.60			.60	
Des Moines, Ia.	Washed concrete mix., 25% gravel, .70; 50% gravel, .90					
Escanaba, Mich.	1.00 cu. yd., all sizes					
Gr'd Rapids, Muskegon, Mich.		.30				.40@ .50
Hersey, Mich.	.50	.50				.50
Indianapolis, Ind.	Washed concrete mix, .55					
Janesville, Wis.					.55	
Moline, Ill.	.80					
Oxford, Mich.					.85	
Rockford, Ill.	Sand and Gravel mixed, .55@.65					
Saginaw, Mich. (Incldg. frt.)	1.05	1.05	1.20	1.20	1.20	1.20
Summit Grove, Ind.	.50 for all sizes					
Wabash Valley District, Ind.	.60 for all sizes					
Winona, Minn.	Pit run gravel under 2-in., .70					
SOUTHERN:						
Albany, Ga.	.60@1.00					
Lindsay, Texas	.75@1.10				.44	
Thomas, La.						.65@ .85
Valde Rouge, La.	Sand Clay 50% metal on ⅜" screen, .60 per ton					
Waco, Texas						.67
WESTERN:						
Pueblo, Colo.	.60	River Run, .60 unscreened				
San Francisco, Calif.	.25 on cars at plant					

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag Wholesale at Plant Per Ton

City or shipping point	Roofing	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Buffalo	1.75	.85	.85	.85	.85	.85	.85
E. Canaan, Conn.	3.00	1.00	1.50	1.15	1.10	1.10	1.10
Erie, Pa.	1.75	.85@1.00	1.00@1.50		1.00	1.00	1.00
Emporium, Pa.		1.00	1.00		1.00	1.00	1.00
Ensley, Ala.	2.05	.90		.90@1.20	1.00	.90	.85
Hokendaugua and Topton, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Lebanon (Donaghmore), Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	.75	1.50	.85	.85	.85	.85
Pittsburgh Dist.	2.50	1.00	1.50	1.00	1.00	1.00	1.00
Sharpsville, Pa.	1.75	1.00	1.25	1.00	1.00	1.00	1.00
WESTERN:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton and Jackson, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Toledo, O.	All sizes, 2.00, F. O. B. Toledo						
Youngstown, Dover, Hubbard, Leetonia, and other Ohio points	1.75	1.00	1.25	1.00	1.00	1.00	1.00

Agricultural Lime and Hydrate Wholesale at Plant per Ton

	Agricultural Lime—Bulk	Agricultural Lime—Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
Alton, Ill.	9.50				
Bellefonte, Pa.	7.25		95.5	.72 to .89	
Berkeley, R. I.		16.00	45	15	
Blakely, Ga.	3.00				
Bridgeport, Pa.	7.50		55	44	10.25
Bristol, Tenn.	5.50				
Canton, O.		9.00			
Cavendish, Vt.	2.50 bbl. in car lots				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Lycoming Co., Pa.	5.00@5.50		78.67	1.33	
Espy, Pa.	4.50		82	1.25	
Grove City, Pa.	7.00 lmp.	9.00 grd.	75.48	0.80	10.00
Harrisburg, Pa.			70		12.45
Hollidaysburg, Pa.	6.50		94.25	.30	
Kirtland, N. M.	10.00				
Knowles, Wis.	8.00	9.50	55	45	9.50
Lime, Ore.	15.00		91.48	0.58	
Louis Brook, Va.	8.00	10.25	90	1	
Manistique, Mich.		10.00	54 & 95	40 & 1.75	10.00
Newburgh, N. Y.			57	38	8.00
Zylontte Station, Adams, Mass.		8.00			

Ground Gypsum Rock, per Ton, at Plant

Castalia, O.—Raw, to cement mills	3.50
Crushed, not ground	3.00
Land plaster	6.00
Fort Dodge, Ia., bulk	3.00
Garhutt, N. Y.—Land plaster, bags	6.00
Grand Rapids, Mich.—Crushed gypsum	3.00
Ground gypsum rock	7.00
Gypsumville, Man., Can.	3.00
Oakfield, N. Y.	6.00
Sandusky, O.	6.00

Jute sacks, $3.00 extra; paper, $1.00 extra.

Miscellaneous Sands per Ton at Plant

(Continued from preceding page)

Delaware, N. J.—Molding	1.50@2.00
Fleetwood, Pa.—Silica heating	2.00
Franklin, Pa.—Core, traction and brass molding	2.00
Molding, fine	2.00
Molding, coarse	1.50@1.75
Gray Summit, Klondike and Pacific, Mo.—Molding fine	1.50@2.00
Greenville, Ill.—Molding coarse red	1.60
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.85
Leesburg, Pa.—Core, furnace lining, molding fine and coarse, traction, brass molding	2.00
Mapleton, Pa.—Molding, fine and core, damp	2.50
Molding, fine, dry	3.00
Massillon, O.—Steel molding coarse	2.50
Furnace lining	3.00
Core	2.50
Millington, Ill.—Core, furnace lining, damp	1.50
Roofing	2.00
Mineral Ridge, O.—Core, molding, sand blast, roofing, brass molding, etc., washed, screened	2.00
Montoursville. Pa.—Core, molding fine, traction	1.25@2.00
Brass molding	1.25@2.00
Michigan City, Ind.—Core, bank	.40
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Ottawa, Ill.—Brass molding	2.00@2.50
Ottawa, Ill.—Sand blast sand	2.75@3.50
Core, furnace lining and roofing	1.75
Stone sawing	1.75@
Ottawa and Utica, Ill.—Furnace lin'g	.85@2.00
Molding, selected	1.50@2.50
Molding, coarse	1.75
Thayers, Pa.—Core and traction	2.00
Wedron, Ill.—Molding	.75@1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.25
Brass molding	1.75
Thayers, Pa.—Molding, fine	1.00@1.25
Molding, coarse, furnace lining	1.00
Zanesville, O.—Molding fine and coarse, brass molding	1.25

Ground Rock Phosphate at Plant, per Ton

Centreville and Gordonsburg, Tenn.—B. P. L., 60% to 72%; ton, 2240 lbs. Ground rock phosphate (90% thru 100 mesh)	6.00@8.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centreville, Tenn.—B. P. L., 60%	7.00
B. P. L., 70% and 78%	8.00
Jacksonville (Fla.) District—Soft phosphate	10.00@12.00
(Add 2.50 for sacks)	
Mt. Pleasant, Tenn—(B. P. L., 70%)	
12%	6.00
13%	7.00
14%	8.00
Mt. Pleasant, Tenn.—B. P. L., 60% to 70%	6.00@8.00
Nichols, Fla.—Pebble, B. P. L., 70%	10.00
Phoslime. Fla.—Soft	14.00@17.50
Walls, Tenn.—B. P. L., 70.2%—	
To County Agri. Assns.	7.50
To others	7.75

Cost Only Basis for Selling Price

IT HAS BEEN reported that very low prices are being made in a certain section of the state. The only legitimate basis for a fair price is cost, and more often than otherwise the low prices reported by customers do not indicate a general tendency towards a lower level. —Illinois Sand & Gravel Producers Bulletin.

New Construction Breaking Records in Detroit

DETROIT, Mich.—With the building industry in and about Detroit taking on a degree of activity that is breaking all records, the natural result has been a shortage of labor and material in some lines. Having adjusted themselves to the former more or less inactive condition, the contractors and manufacturers have been forced to increase their facilities and organization to meet the new requirements, says the magazine of the Detroit Builders' and Traders' Exchange.

During May, for instance, the total new work was $6,712,000, as compared with $1,811,670 a year ago, and $4,190,935, for May, 1917. In this total of nearly seven millions, was 1,538 housing accommodations, including 779 single residences, 204 duplexes, 31 terraces, for 336 individual families and 75 apartments in conjunction with stores.

Building Boom Begins in Pittsburgh, Pa.

PITTSBURGH, Pa.—New homes have begun to sprout all over Greater Pittsburgh and the suburbs in general. Evidently the investor is taking the contractor at his word and is building now, realizing building materials will not be cheaper for a long time. Pittsburgh and the district generally are short thousands of houses.

The country at large has not kept pace with the natural growth of population. It is little surprising, therefore, that the June report of building permits issued here shows an increase of $184,537 over the corresponding month of 1918, and word comes that millions of dollars' worth of projected buildings are under way.

California Votes $40,000,000 Bond Issue for Roads

OAKLAND, Calif.—July 1 California voted on a $40,000,000 bond issue for good roads, which carried generally throughout the state 7 to 1, many of the country precincts voting unanimously in its favor.

Passed By The Screens

Sand and Gravel

Rich Gravel & Excavating Co., Knightstown, Ind., filed final certificate of dissolution.

The Southern Sand Co., of Little Rock, Ark., has increased its capital stock from $15,000 to $50,000. A. C. Butterworth is president.

C. J. E. Anderson, Chicago, has closed a contract to supply 15,000 cu. yd. of sand and gravel to the Conway Paving Co., to be used on Illinois highways.

A sand and gravel filter bed to purify the water of Little Black Creek so that it may be used for municipal purposes is being favorably considered by the authorities of Muskegon Heights, Mich.

The American Sand & Gravel Co., of Virginia, which operates sand and gravel pits in various sections, and has acquired valuable property near Providence Forge, Va., will operate the pits there on a large scale. Much will be shipped from Providence Forge to Richmond and other points where much building is going on.

Bichler Bros., of Groos, Mich., have taken over the sand and gravel plant of the Escanaba Stone and Gravel Co., owned by A. R. Moore of Escanaba. Mr. Moore has virtually dismantled the stone crushing plant. The deal involves a considerable amount of money, as the Moore company was considered one of the most productive businesses in this line in the vicinity. Mr. Moore says that other interests demanded so much of his time that he felt he was not able to devote the necessary work to looking after the details of the business.

A strip of wharfage 760 ft. along the Mississippi River front at St. Louis has been leased by the Meramec Portland Cement & Material Co., at the rate of $3,600 a year. This is a reduction in rent and was authorized by Comptroller Louis Nolte because the Meramec company's levee holdings north of the Municipal docks at North Market street were rendered useless some time ago when the city levee department drove piles into the river in the vicinity of the company's property which caused the land to form in the river in front of the wharf. Comptroller Nolte holds that the company is entitled to this reimbursement in the form of a reduction in rent, because the company's lease had still 20 months longer to run under the old contract and this deal compensates the company in the form of three years free rent.

Two big contracts recently consummated by the Construction Materials Co. of Chicago for sand will each take a year's time to fulfill. These are the 800,000 cu. yd. fill on the site of the proposed new plant of the H. W. Johns Manville Co. at Waukegan, Ill., mentioned in Rock Products June 7, and the 300,000 cu. yd. fill for the proposed new plant of the Continental Motors Co. at Muskegon, Mich. For the Waukegan job a special dredge is being built for there the sand is on the site and is to be merely transplanted and a channel is to be cut from the lake. To Muskegon the sand must be brought. The hydraulic sand boat L. L. Barth will obtain the sand in the lake four miles distant. These two bring the total to four big jobs in the past two years. The company furnished 300,000 cu. yds. of sand for the Field Columbian Museum, and 1,500,000 cu. yds. for the Mark Mfg. Co. at Indiana Harbor.

Retail Dealers

Western Waterproofing Co., of Detroit, has taken over the Cleveland branch, with J. C. Kearney as secretary and general manager and L. S. Wertz as district manager for the Cleveland office.

Secretary Dan Carey of the National Association of Builders' Exchanges, states that President C. W. Bernhardt has issued a call for a meeting of the Board of Control to be held in Baltimore on Monday and Tuesday, July 28 and 29. The following important matters will be included in the two days' program: Report of the Committee arranging for a National Association of Building Trades Employers. Consideration of a Plan for a National Board of Jurisdictional Awards in the Building Industry; Report of the Field Commissioners; Report of the Special Committee on the Constitution and By-laws. The first semi-annual conference of Builders' Exchange Secretaries will also be held at the same time and place.

William Goodrich is now out of service and back on the job. He is located at 251 Equity Building, Detroit.

Walter Dreyer, of Detroit, Mich., who recently arrived from overseas, has returned to the Otto Misch Co., acting under his old capacity as secretary.

The American Renaissance, Inc., Milwaukee, Wis., capital stock $30,000. A. C. Hoppe, Art L. Richards, Harold A. Richards—dealing in all building materials, publication of architectural plans, etc.

Wm. Horrabin Constructing Co., Iowa City, Ia., capital, $200,000. General contracting, paving and materials. President, Wm. Horrabin, Vice-President, Albert F. McMahan; Secretary, Chas. L. Brainard.

Hobart & Mathews, building supply dealers, Indianapolis, Ind., suffered $1,000 in damage from vandals who broke into their cement block factory. Thirty window panes were broken, a cement mixing machine was put out of commission and two cement block machines were badly damaged.

Quarries

L. C. Ruban, of McAfee, N. J., has sold 125 acres of the Pochuck farm, at McAfee, to a limestone concern for $10,500. It is reported that the new purchaser will erect a large crushing plant just as soon as the title passes.

W. J. Sparks, of Mt. Vernon, and Joe S. Boggs and Sam P. Branham, of Richmond, Ky., have purchased from S. English, of Lexington, Ky., the quarry, crushing machinery and equipment of the English Stone Co., at Yellow Rock and have taken over the contract with the L. & N. railroad for crushed stone and ballast. This is one of the largest stone plants in the state.

The stockholders of the Farmers' Co-operative Limestone Association met at Branchville, N. J., recently for the purpose of completing the organization. The articles of incorporation have been filed with County Clerk Hopkins. It was announced that $5,000 of the capital stock of the association had been subscribed, and the most of it paid in. The lease to the quarry limestone on the farm of Isaiah Hornbeck at Branchville, for a period of 49 years, was executed.

The slate business, once the leading industry of the upper end of Lehigh County, Pa., but practically dead since the outbreak of the war nearly five years ago, will soon witness a remarkable revival, is the prediction of operators. The industry, when running full, employs over 5,000 hands. The product is chiefly roofing slate, mantels, blackboards and school slates. Much of the product of the quarries was sent abroad and the resumption of commerce is expected to be followed by the reopening of business relations between the Lehigh slate manufacturers and their foreign customers. Another sign of the reviving industry is the fact that school slates are again, because of the high prices of paper, coming into use in the public schools of this country, large orders having been booked for early delivery in the western states.

Lime

M. M. Hussey, of Palmyra, Tenn., has sold to George Fort, Robert O'Neal of Clarksville, Tenn., and G. W. Dinsmore, of Dotsonville, Tenn., the Palmyra Lime Works. Mr. Hussey had been operating this plant for many years, and now, because he is retiring from active business, agreed to the sale. The new owners expect soon to be making, in addition to burnt lime, pulverized lime. The location is on the Louisville & Nashville railroad. Mr. Dinsmore will make his residence at Palmyra and act as general manager of the company.

Phosphate

The Peerless Chemical Co. of Columbia, Tenn., is planning the erection of a ground phosphate plant with a daily capacity of 400 tons; cost, $80,000 to $100,000.

Incorporations

Blackstone Road Material Corporation, Wilmington, Del. Capital $1,000,000.

Manor Sand & Gravel Co., Wilmington, N. Y. To quarry or excavate stone, rock, etc. Capital $50,000.

The Mount Solon Lime Co., $50,000 capital stock, and chartered to establish lime works at Mount Solon, in Augusta County, Va.

Keystone Gypsum Co., Wilmington, Del. Manufacture and sale of gypsum, plaster, plaster of paris, asbestos, etc. Capital $200,000.

Fred H. Lawlor Co., Inc., Springfield, Mass; quarry, cut and polish granite and other stone. $1,000. Directors: Fred H. Lawlor, Springfield, President and Treasurer; Edna M. Gibbs and W. L. Cronin.

The Bible Sand Company, Hamilton County, Tenn. Capitalized at $3,000, with W. C. Mills, M. P. Wall, W. L. King, J. Finlay and F. R. Spellberger incorporators. Headquarters probably at Chattanooga.

Aurora Mico Co., Groton, N. H. Capital, $250,000. Object: Mining business—especially dealing in mica. Incorporators: J. J. Mallonee, Greensboro, N. C., J. A. Rogers and Franklin Osborn, North Groton, N. H.

J. R. Griffith, Racine, Wis. Capital, $20,000. W. Y. Galloway, J. E. Pritchard, Peter J. Myers, incorporators. Dealing in building materials, machinery and contractors' supplies, quarrying stone sand and gravel, construction of highways, bridges, paving and macadamizing streets.

Gleason Mineral Products Co., St. Cloud, Minn. Purpose: Buying, owning, improving and dealing in mines and quarries. Capital, $100,000. Incorporators: Charles A. Bardessono, President; Hugh McEwan, Vice-President; S. Valentine Saxby, Secretary-Treasurer. All of Hibbing.

The Price Mineral Products Co. has been incorporated under the laws of Missouri to mine, quarry and mill ochre and other minerals. The company is capitalized at $20,000. The incorporators are Gabe M. Geist, Henry W. Brandan, Mauel M. Kauterman, Jacob P. Blives, Dennis L. Layer, Sam Prince and G. H. Pride. Location not given in notice.

W. C. Tyrrell, A. L. Luick and John Berg of Belmond, Ia., recently purchased the Wilbur farm north of Belmond with the intention of commercializing the gravel deposits. They will install machinery and run a spur track from a railroad line. They have already made a contract to supply the Empire Construction Co. of Des Moines with 8,000 carloads.

Manufacturers

The Thew Automatic Shovel Co., of Lorain, O., is circulating Industry Bulletin No. 30, on Highway Construction, just from the press. It is an argument for good roads and is filled with pictures. The Thew power shovels, electric, gasoline and steam, with their special features applicable to a variety of work under many conditions are fully described.

Portable Machinery Co., Inc., manufacturers of the scoop conveyor, of Passaic, N. J., is distributing a circular entitled "We Welcome Fair Competition." The circular briefly describes an attempt at copying and at marketing of an imitation of the scoop conveyor. As there is a suit now pending for infringement of rights, the circular warns prospective purchasers of portable conveyors against purchasing the alleged imitation.

The Smith Engineering Works, Milwaukee, Wis., has issued two new bulletins, Nos. 261 and 266. Bulletin No. 261 covers the subject of "Telsmith Primary Breakers" concisely and completely. This bulletin gives the principal features and advantages of the Telsmith gyratory and jaw crushers. Bulletin No. 266 is on "Mining, Quarry and Gravel Pit Machinery," and is a welcome addition to the trade literature on these subjects. It includes some description of crushers, but is more largely devoted to screens, washers, sand tanks, scrubbers, grizzlies, elevators, etc.

Personals

Judge Craig of the Galesburg Sand & Gravel Co., Galesburg, Ill., has been appointed a member of the new State Tax Commission.

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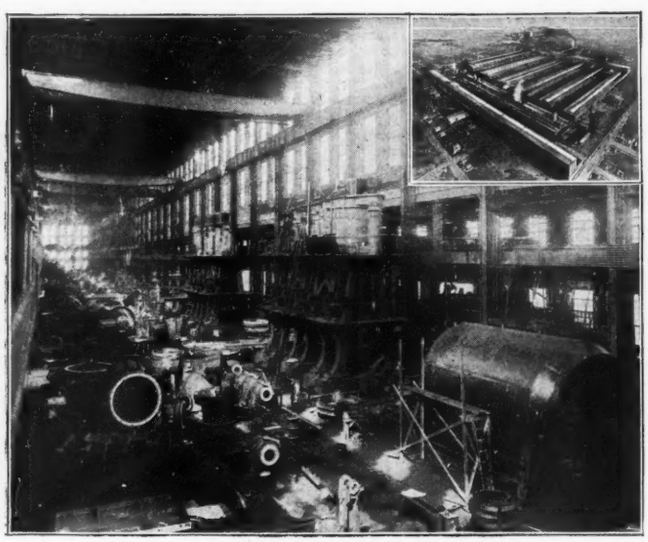

Interior View of Erecting Shop

This building is 1,157 feet long and is one of 14 buildings comprising the West Allis Plant shown in the insert.

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